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THE CAUSES AND TREATMENT

OF

IMPERFECT DIGESTION.



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OF

IMPERFECT DIGESTION.

BY

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Fifth Edition, Revised and Enlarged.





LONDON:
JOHN CHURCHILL AND SONS, NEW BURLINGTON STREET;
CHARLES GRIFFIN AND CO., STATIONERS' COURT.

MDCCCLXX.

LONDON:
BENJAMIN PARDON AND SON, PRINTERS,
PATERNOSTER ROW

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The following pages contain the results of a long-continued attention to derangements of digestion. My aim has been to utilize such materials as I possessed, rather than to seek them elsewhere; in short, to write little which my own experience had not verified.

The great difficulty has been to write a short rather than a long book on a subject so comprehensive. The classification of the varieties of dyspepsia was adopted after much consideration, and I venture to hope will be found practically useful. To prevent unnecessary repetition, typical, but not overdrawn cases have been substituted for more diffuse illustrations from my case-books. A brief account of the physiology of digestion appeared desirable, for the sake of laying before the reader the recent advances of science in this direction.

12, Old Burlington Street,
February, 1860.

ADVERTISEMENT TO THE FIFTH EDITION.

THE best excuse for the publication of a new edition of a work is increased demand. Five thousand copies of this book have now been printed, and the sale steadily improves. Meanwhile, the Author has endeavoured to make it more worthy of the attention it has received. The whole has been carefully revised. A chapter on mineral waters adapted for dyspepsia, and one on the relations between dyspepsia and the function of sleep, have been added.

12, OLD BURLINGTON STREET,
January 1, 1870.

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IMPERFECT DIGESTION,

ETC.

CHAPTER I.

THE CAUSES OF DYSPEPSIA.

The digestive power may be compared to the physical strength. Every individual can without inconvenience carry a certain weight, while any addition to it is accompanied by a proportionate sense of oppression. In the same way, what is called indigestion is often simply a result of excess. The amount of food which each man is capable of digesting with ease has always a limit. This limit bears relation to his age, constitution, state of health, and habits.

For undisturbed digestion two conditions are

essential: a proper relation of the aliment to the digestive organs, and a healthy state of the organs themselves. The first is generally within direct control; but obviously with the second, this is not the case; and when, as frequently happens, both conditions are imperfectly fulfilled in the same person, more or less dyspepsia ensues.

Bearing in mind these general views, let us examine the influence of particular causes; and first, as regards age.

Appetite, or the natural feeling that food is wanted, indicates that the waste of the body requires to be replenished—that the outlay begins to exceed the income.

From birth to the moment of dissolution, waste and supply are in active operation. The infant, in consequence of its rapid growth, requires food at short intervals, and the energy of the wasting process is shown by the activity of his excreting organs. So long as growth continues, the same conditions may be observed, but in a lessening degree.

When the stature and form of the body are matured, the demands for nutrition are less

urgent, and, after middle age, are diminished still more. The practical inference is, that the man of advanced years does not require, and should not take, as much food as the young man.

How this was recognised by a profound thinker, may be read in Cicero's "Essay on Old Age." He expresses himself gratefully, that while advancing years increased his desire for conversation, they had diminished the necessity for food and drink.* But such reflections are seldom made, and still more rarely acted upon.

At all stages of adult life, but particularly during its decline, the appetite is over-stimulated by condiments, and tempted to excess by culinary refinements.† Dyspepsia is not the worst result of this. Gout, and still more serious maladies connected with an impure state of blood, closely follow.

* "Habeo senectuti magnam gratiam, quæ mihi sermonis aviditatem auxit, potionis et cibi sustulit."

† Abernethy, in his peculiar style, insists that civilized man "eats and drinks an enormous deal more than is necessary for his wants or welfare. He fills his stomach and bowels with food which actually putrefies in those organs."

Infringements of the laws of digestion are constantly and in many instances unconsciously committed. One man digests with ease an amount of food which would be fatal to the comfort of another. Animal food is easily digested by some persons twice, or even three times daily; while, if taken by others more than once, it is sure to induce suffering. Nevertheless, the diet of persons associated together is apt to be the same, and a sufficient individuality in matters of eating and drinking is seldom observed.

When the general health is impaired from any cause, digestion infallibly suffers. In many instances it is sought to prop up the one by overtaxing the powers of the other, and dyspepsia is often thus permanently added to the old disorder.

The proverb, "Custom is second nature," applies to the human constitution. Health may be maintained, by gradual usage, under circumstances which would be disastrous to the novice. In this country, great faults are committed in the relative amount and distribution of meals. Breakfast frequently consists of tea

or coffee, with a small proportion of plain bread or toast. This allays the appetite, but is insufficient for the supply of bodily waste during the long interval between breakfast and a late dinner; during which, in many instances, no luncheon is taken. It also often happens that no solid food is taken from dinner-time until the following morning, which is an additional reason for a more substantial breakfast.

Experience shows that the delicate stomach suffers severely from these causes. In some instances, the long unemployed organ secretes an excess of mucus, which greatly interferes with digestion.

A sufficient amount of food at breakfast has a direct influence on the digestion of dinner; in which process, large quantities of gastric juice —a fluid charged with nitrogenous and other materials, must be suddenly extracted from the blood. No argument is needed to prove that the blood will be better fitted for these demands upon it, if replenished by the absorption of a substantial breakfast. If gastric juice, insufficient in quantity or of bad quality, be supplied,

the appetite for dinner exeeeds the digestive power, and another material cause of dyspepsia arises. Long abstinence thus eauses the amount of food taken at dinner to be relatively, as well as absolutely, in excess. When a suffieient quantity of nutriment has been taken in the morning, less will be requisite at a later period, and less will be desired.

The distribution of meals in point of time is by many regarded as quite unimportant. Dinner, as has been said, eomes late, quiekly followed by tea, and sometimes by supper also. This approximation of meals is pernieious, for the human stomaeh was unquestionably intended to have intervals of rest. The organ should be allowed to act on its eontents *en masse;* to eat constantly like a ruminant animal is altogether unnatural. The health of any individual would speedily break down, were even the proper amount of food taken in equally divided portions at very short intervals.

Continual alteration of the time of meals is another great mistake. Every hour of the day for dinner, from one to eight, will sometimes

be ranged through in the course of a single week. Such irregularities may long be endured by the robust stomach, but are very injurious to the weakened organ. In relation to time, all our functions are singularly influenced by habit.

Digestion, therefore, will be best performed at the period when the stomach, from habit, expects employment.

The kind and quality of food are essential considerations; and these subjects will be considered in detail under the head of Treatment. Adulteration of food is without doubt a cause of dyspepsia. Inferior articles of diet, such as tough meat or coarse fish, may, in those unaccustomed to them, produce serious inconvenience; and the impurities of water are well known to disorder digestion.

Man inhabits every part of the globe where external influences can be successfully resisted, and in effecting this, food is an important element. The colder the climate the more animal food and oily substances are requisite; the warmer, the more vegetable diet is suitable. Whale-blubber to the warmly-clothed Esqui-

maux, and rice to the naked Negro, are not more necessities of locality than they would be matters of choice. The same indications exist even within European limits. Thus, diet in England and in Italy is essentially different.

The effects of universal communication are nowhere more obvious than on the luxurious table. To furnish the refined *cuisine*, all climates, both sea and land, are laid under contribution; and the stomach is expected to digest everything that is put into it. Huddling together such various products, and neglect of the relation between climate and food, are active causes of dyspepsia. The substantial dishes of this country accord badly with the thermometer at ninety degrees; thus, amongst the English in India, inflexibility in regulating the kind and quantity of food taken is the cause of much ill health.

Under the head of the relation of food to the organs may be placed the effects of insufficient mastication. It is a fruitful source of dyspepsia, and is more frequently caused by haste or carelessness, than inevitable from the want of teeth. The great prevalence of dys-

pepsia in the United States has been attributed to the rapid and characteristic manner in which meals are there despatched. In some employments the insufficient time allowed for meals is, for the same reason, a cause of disturbed digestion, and too often gives rise to permanent disease.

Besides actual loss, soreness of the teeth or of the gums, sometimes attended by fetid secretions, greatly interfere with mastication. It is most important that solid food should be duly prepared, by chewing, for the action of the stomach; and it is also important that the starchy elements of food be sufficiently submitted to the action of pure saliva.

There are numerous other causes which affect the digestive organs less directly, but no less injuriously. It has been assumed by some writers that the conditions of civilization are incompatible with the highest degree of health. But there is every reason to believe that dyspepsia affects all races. The Laplander is especially subject to water-brash; the Maories of New Zealand suffer much from dyspepsia; and the use of bitter substances to promote

digestion is known to many savage tribes. The extremes of abstinence and repletion common with savages, their precarious mode of existence, their fits of complete indolence, followed by exhausting fatigue, must cause them a full share of digestive trouble.

The relative superiority in physical strength of civilized over savage nations has been sufficiently proved. Refined and settled habits are not *necessarily* attended by any physical disadvantages. But it is observable, that those who live in towns are most affected by dyspepsia. There it is that the mental powers are most overtasked; and the relation between mind and body, as well as their mutual reactions, disregarded or forgotten. Too large a share of the nervous energy, so necessary for digestion, is expended in mental toil or business anxieties. In many cases, attention to the commonest physical wants is neglected in monotonous pursuits; the appetite for food is disregarded until it no longer exists; exercise is either not taken at all, or is fitful and unseasonable; ventilation is neglected, and a close and polluted atmosphere is breathed. Such

is no overdrawn picture of the town life of vast numbers who suffer, more or less, from dyspepsia.

Two habits, smoking and taking snuff, require specia notice as causes of dyspepsia. Excessive smoking produces a depressed condition of the system, and a great waste of saliva if the habit of spitting is encouraged. I have met some severe cases of dyspepsia clearly resulting from these causes. Some individuals are unable to acquire the habit of smoking even moderately. Deadly paleness, nausea, vomiting, intermittency of pulse, with great depression of the circulation, come on whenever it is attempted. But this incapacity is exceptional, and so universal is the desire for tobacco, that it seems as if some want of the system is supplied by its use.

Smoking has been attacked and defended with much zeal. Its adversaries have strongly urged that the practice is a potent cause of dyspepsia. The late Sir Benjamin Brodie was a great enemy to tobacco. But as one of his biographers has observed, he appeared in this instance to have departed from the rule by

which he was generally guided, to weigh impartially all the facts bearing on an argument. Other names of eminence might be cited in the ranks of those who are strong opponents of smoking.

On the other hand, tobacco stands in no want of facts or of able advocates in its favour.

It has been proved beyond question, that where men have been exposed to the combined influences of cold and want of food, those who smoked displayed most endurance. Dr. Hammond states, that smoking in moderation, if the food be at the same time sufficient, increases the weight of the body.* The author of a clever work on physiology states that a cigar after dinner notably assists his digestion.† I am often told by patients that the sense of oppression felt after meals is relieved by smoking. The explanation depends on the strong sympathy which exists between the stomach and the salivary glands. One proof of

* Physiological Memoirs. By W. Hammond, M.D. Philadelphia, 1863.

† The Physiology of Common Life. By G. H. Lewes, M.D.

this dependence is that sickness of stomach is commonly attended by salivation. This makes it probable that when the salivary glands are stimulated by smoking, the gastric glands, in obedience to a sympathetic action, pour out their secretion more freely. But if a depressing effect on the nervous system is induced by smoking too much, digestion is certain to be impeded. On the whole, smoking is the cause of more harm than good to digestion. That kind of chronic nervous depression which belongs to hard and inveterate smokers is always accompanied by dyspepsia.

The effects of taking snuff are more insidious, as no warning is given by immediate bad consequences. Great snuff-takers are often sufferers in the stomach. In addition to the specific effects of tobacco, the continued stimulating and mechanical action of snuff on the mucous membrane of the nose is injurious. Irritation is directly transmitted from the nasal surface to that of the stomach, with which it is continuous. Dry snuffs are more hurtful than moist, as they penetrate farther.

The difficulty of breaking off or even mode-

rating this habit is well known, and the following plan, practised with success by an inveterate snuff-taker, is worth mention. Instead of pure snuff, he kept in his box a mixture in equal parts of snuff and powdered valerian root. His theory was, that the valerian repaired the ravages of the snuff upon his nerves, but the more probable explanation of the benefit is, that he consumed much less of the disagreeable compound than he did of pure snuff.

Persons engaged in offices are exposed to a directly exciting cause of indigestion. The stooping posture in which they write, mechanically interferes with the stomach's action. I have even traced well-marked dyspepsia to sitting immediately after dinner, in a low arm-chair, so that the body was curved forwards and the stomach compressed. In some trades the pressure of certain implements upon the pit of the stomach, as in the case of curriers, bootmakers, and weavers, produces severe dyspepsia. Many bad cases, attended with water-brash, occur amongst the weavers of Spitalfields.

Self-indulgent, luxurious habits, are highly injurious to healthy digestion; but on this

threadbare subject it would be mere waste of time to enlarge. Idleness, and the want of a definite pursuit in life, must also rank high in this class of causes. To preserve the general health, occupation is as necessary for the active mind, as exercise is for the vigorous body.

The importance in the system of the reproductive functions is such, that their exhaustion must, sooner or later, react on the functions of nutrition. Lamentable instances of the results of sexual excess are occasionally met, and dyspepsia is almost invariably one of these. But the injurious effects of a free indulgence of the sexual instincts have been highly coloured. Unprincipled men, who prey on the young and the inexperienced, magnify and distort the significance of certain ailments, the treatment of which in too many instances pass out of the hands of the regular practitioner.

In youth the sensations are quickest, and the impressions most fresh and vivid; so that it might be supposed life would be always then most keenly enjoyed. But its earlier years are frequently clouded. An aching desire for change and excitement often destroys

present happiness; and when the desired excitement is unattainable, *ennui* and a hopeless indolence ensue. Experience convinces me that this condition of mind is but a frequent result of a feeble state of health. This can be often traced to an overstrain of the mental powers — a strain daily increased amongst men by a spirit of emulation fostered and rewarded by the competitive system to an extent formerly unknown. Accomplishments also amongst girls are made objects of relentless perseverance. In both sexes, at a time when growth is incomplete, and new functions are springing into existence, the mental are developed at the expense of the bodily powers. Nutrition suffers because appetite and digestion are impaired, and the power of the mind itself is weakened. Over-exertion of mind fatigues equally with that of the body. No reasonable doubt can therefore be entertained that *thinking* is the result of a physical action in the brain. In what may be for convenience termed secretion of thought, demands are made on nutrition just as in bodily exercise. It has been often observed that great *thinkers*, if healthy, are usually large *eaters*.

The state of the air we breathe is highly important in relation to dyspepsia. We live at the bottom of an elastic medium, presenting everywhere the same general composition, and exactly adapted to the exigencies of animal life. Any accidental impurity of the atmosphere tends to disturb the balance of health. Oxygenation of blood is the object of respiration; and its replenishment is the object of digestion. On the other hand, the digestive secretions, as well as the nervous energy by which they are governed, depend for their perfection upon the perfect state of the blood. For this reason ill-ventilated workshops and crowded sleeping-rooms amongst the poor, and the overheated and impure atmosphere of assemblies and public places of amusement amongst the better classes are constantly acting causes of dyspepsia.

Many invalids are affected by changes of weather, especially if these changes occur suddenly. Even in the healthy, a general feeling of discomfort is caused by easterly winds; and various disorders are greatly aggravated by them. Rheumatic patients are especially susceptible of bad effects from damp or cold

winds, and many dyspeptics are hardly less so; an unusually dry atmosphereis equally injurious to others.

As in the case of a change of climate, the quantity and kind of food required are much influenced by season and temperature, and the agency of these in causing dyspepsia is, therefore, not to be wondered at. Some dyspeptics are always better in summer than in autumn or winter, others the reverse; while a great many tell us they suffer more in spring than at any other season.

Our bodies are at all times pervaded by electricity, the condition of which often completely changes. The clear, serene atmosphere is usually charged with positive electricity, and this, by induction, causes our bodies, as well as the earth itself, to be negative. In wet or stormy weather the opposite of this state of things is usual; the atmosphere is negative while our bodies are positive. We are unable in health to detect these electrical changes; but we might reasonably look for their effects when disease had rendered the body less capable of resisting external impressions. The

probable effects of electricity, when the health is susceptible, will be again referred to.

We have still to consider instances in which, although the food may be suitable, and the digestive organs healthy, dyspepsia may be induced by an immediate and accidental effect upon the organs, through the influence of the nerves.

There are certain sensations, of which nausea is a remarkable instance, not obviously assignable to any of the five senses; and all these sensations seem capable of being excited by mental influence. We are all conscious that the stomach is a region of sympathy; and here Van Helmont placed the seat of the soul itself. With the stomach, or with the bowels, easily confounded with it, various passions—as joy, sorrow, compassion, and indignation—have been in all times associated.

It is universally known that bad news received at or preceding a meal will spoil the best appetite. A disagreeable mental impression sometimes even produces severe dyspepsia, with epigastric pain and sense of oppression, nausea, or vomiting. The intimate nervous

connection between the stomach and the brain leaves us at no loss to explain this; and probably an arrest of the secretion of gastric juice is the immediate cause; for in the same way the mouth will become dry from a diminished secretion of saliva. Dyspepsia is also produced or aggravated by severe mental exertion immediately after meals because of the untimely expenditure of nervous power.

Violent bodily exercise when the stomach is full is a well-known cause of disturbed digestion; and in this case the disturbance seems mechanical. The motions of the stomach cannot be favourably carried on while its contents are tossed about by rapid movements of the body; for we know it is essential to the due solution of food that it should be all in turn brought into contact with the stomach's surface.

A cold bath after a full meal will frequently disturb digestion; and a hot bath either of water or air will do so with still more certainty.

Dyspepsia from warm and cold bathing occurs, in each case on the same principle, but for opposite reasons. It has been proved from

observations on Alexis St. Martin,* that congestion of the stomach is most unfavourable to the secretion of gastric juice. Now, the shock of cold bathing produces congestion, by driving the blood from the surface of the body to the viscera; on the other hand, a certain flow of blood to the stomach is equally indispensable, and *that* would be interfered with by the hot bath, because it draws the blood from the viscera to the surface. Free blood-letting soon after a meal is commonly succeeded by vomiting, and this affords another example of the effect of sudden withdrawal of blood from the digestive organs.

Dyspepsia has the widest range of all diseases because it forms a part of almost every other; and some, as pulmonary consumption, are in many instances preceded by it. In such cases, early attention to the defects of nutrition would often avert a fatal issue. The gravest forms of dyspepsia accompany organic changes in

* St. Martin is, or was very lately, living in America. A free communication, which became permanent, was established between his stomach and the outside of his body by a gun shot wound in 1822. The admirable observations of Dr. Beaumont on his case will be spoken of further on.

the alimentary tube itself, as cancer and ulcer of the stomach; but the plan of this treatise includes only the functional derangements of digestion, and my observations will be chiefly directed to those of which the stomach is the seat. Even with this limitation, dyspepsia is the most frequent malady of civilized life; although, fortunately, not equally a cause of death. It cannot be affirmed that simple dyspepsia does not sometimes shorten life, by producing another disease, or even prove fatal of itself; yet it is certain that digestion may be performed with difficulty for many years without more serious results than proverbial suffering and discomfort.

CHAPTER II.

THE SYMPTOMS OF DYSPEPSIA.

The symptoms of dyspepsia are extremely numerous, and many of them may easily be confounded with those of other diseases. This makes the diagnosis of dyspepsia both a matte of great moment and of much difficulty. The symptoms which are most important will be now described.

One of the most common and direct of all is an uneasiness in the region of the stomach, felt soon after taking food, and proportionate to its amount or nature. This uneasiness is variously described as fulness, tightness, weight or oppression—a feeling as if the stomach was not large enough for the meal, or as if there was something heavy in the organ, &c., probably more according to the fancy of the patient than from any intrinsic difference in

the sensations. But while they always indicate a real defect, it is incorrect to assume that the sensations depend exclusively upon delay in the reduction of solid food to chyme, although this is often the case. The same symptoms frequently occur after liquid food; and I have known them produced in certain cases by simple water.

Flatulency, or gaseous distension of the stomach and bowels, is another common and very troublesome symptom. As gases are always present in the stomach, flatulency is in one sense simply an exaggeration of a natural condition. One source, and probably the only healthy source of gases in the stomach, is swallowed air. This gradually loses oxygen until, in the small intestine, the atmospheric proportions are greatly altered. Nitrogen, therefore, seems the chief distending medium which mechanically aids digestion; by incorporating with the fæces, it facilitates their transit through the intestines.* But carbonic acid produced by fermentation is the chief cause of flatulence.

* See Chapter X. and Appendix B.

The semi-vital, semi-chemical process, digestion, is closely pressed upon by another process —fermentation. So closely does it follow, that any delay or fault in the solution of the alimentary mass, or any arrest of its proper rate of progress through the alimentary tube, constantly induces it. Here, then, we have a gas-producing element of great power. Now, too, we see that flatulence will be proportionate to fermentation, and fermentation to the hindrance of digestion. It has been proved by experiment, that during fermentation an apple will evolve a volume of gas six hundred times its own size. Some notion may be obtained from this of the amount of flatulence which may be caused by this process. It is difficult to say whether, even within the limits of natural digestion, some amount of gas may not be formed by fermentation; but I am inclined to regard it as foreign to the healthy organism.

I shall afterwards have occasion to mention that, under certain circumstances, an almost instantaneous gaseous distension of the stomach occurs in dyspepsia; a like kind of flatulence happens in hysteria, and then the bowels are

usually involved.* From the suddenness with which flatus is produced in these cases, and the fact that the stomach is often empty at the time, it is plain that fermentation cannot be the cause. There is also evidence, derived from experiment, that the tasteless gas evolved consists mainly of nitrogen, which is not a product of fermentation.

Eructation, or the free discharge by the mouth of gas from the stomach, usually occurs voluntarily. In a smaller degree it is, however, often involuntary, and the gas is apt to be flavoured by some substance that happens to be in the stomach, as fish, onions, celery, cod-liver oil, &c. This is what is meant by patients when they tell us that what they eat "repeats itself." It is sometimes a source of great annoyance.

The derivation of nausea from *vaûs*, a ship, is sufficiently expressive. In sea-sickness, as in many other instances, nausea always precedes vomiting. In some cases of chronic vomiting, however, no nausea is experienced; and, on the other hand, nausea may be habitual, although

* See Appendix B.

unaccompanied by vomiting. Debilitated persons, in whom digestion is weak, often suffer severely from nausea alone; and in these cases, after nausea has subsided, the stomach often becomes suddenly distended with gas.

Vomiting is much oftener a result of accidental than of chronic dyspepsia, and when habitual, is generally caused by organic disease of the stomach. Opinions differ as to whether vomiting is mainly effected by contractions of the muscular fibres of the stomach. I am of opinion that such contractions do occur, and that retchings or ineffectual precursory efforts are due to obstinate closure of the cardiac orifice of the stomach, the natural condition of which is that of a door opening inwards with ease, but outwards with difficulty. Instances are recorded of persons possessing the power of vomiting at will.

When vomiting is much prolonged, nothing is brought up but bile and tenacious mucus. Bile is not natural to the stomach, but is introduced into it by extension of the action of vomiting to the upper part of the small intestine; and this is evidence that vomiting is the

result of true contractions of the stomach. A certain quantity of mucus is natural to the empty stomach; but the irritation of vomiting induces an unusual flow of the secretion. In rare cases, however, mucus, by oppressing the stomach, is itself a cause of vomiting. Gastric catarrh, as such a flux of mucus is termed, is generally associated with the same affection of the mucous membrane elsewhere; thus, in chronic bronchitis, and in whooping-cough, a copious discharge of mucus from the stomach is common.

Allied to vomiting is regurgitation, usually an involuntary and feeble action, but one by which both fluids and solids, with or without gas, are raised from the stomach to the mouth. The mechanism consists in a reversal of the movements made by the gullet in swallowing; and this being extended to the lower end of the tube, small portions of the contents of the stomach are brought up.

Natural regurgitation occurs in the case of the cud-chewing animals, but instances are recorded of habitual cud-chewing in the human subject, and one has fallen under my own

notice. It happened in the person of a young man of much intelligence, who was troubled with dyspepsia; regurgitation was one of the symptons, and it became at last considerably under control of his will. He discovered that, however disgusting, the best mode of avoiding further digestive suffering was to re-chew the food when raised into the mouth. On swallowing this, another portion was transmitted from the stomach, and the process was thus prolonged, until much if not all of the meal was re-chewed.

Pyrosis, or water-brash, sometimes exists without other symptoms, on which account Dr. Cullen described it as a distinct affection. In this form it is most prevalent in the spring season, and occasionally appears as an epidemic. The poorer classes are most affected by it. Cold climates, certain kinds of food—as, in Scotland, oaten diet—are exciting causes of pyrosis. Constant irritation of the stomach by the indigestible parts of the grain induces it. In Ireland, even when potatoes were the almost exclusive food of the peasantry, the same prevalence of pyrosis was not observed.

Pyrosis too often indicates organic disease of the stomach.

Water-brash, consists in the ejection from the mouth of a secretion often limpid and tasteless. There is a distinct perception that it comes from the gullet, and a sense of constriction at the pit of the stomach precedes the discharge, which is followed by relief. The fluid varies in quantity from less than a mouthful to more than half a pint, and is sometimes described by the patient as feeling perfectly cold in the mouth. Sometimes the secretion is neutral to test-paper; at others alkaline or acid. In severe cases this fluid possesses very irritating properties, and some describe it as corroding the gullet and throat. The constriction in the stomach is accompanied by pain, which is increased by standing erect; relieved by stooping, and by pressure. It is, therefore, a common practice with patients to press the pit of the stomach strongly against the edge of a table or other hard body.

Water-brash occurs at all times, but most commonly when the stomach contains no food. The fluid is derived from various sources. Some

patients are conscious of an increased flow of saliva during the attacks, and it has been suggested that certain glands situated in the lower portion of the gullet are the chief sources of the discharge. But occasional acidity, and the fact that portions of half-digested food are sometimes mixed in it, prove that the stomach is also engaged.

Another affection, heartburn, has been confounded by some authors with water-brash. The occasional acridity of the ejected fluid and its effects have been already mentioned; but heartburn without pyrosis is very common, while water-brash may be unattended by any sensation like true heartburn. In the popular meaning, it is a disagreeable and peculiar burning sensation along the entire gullet, often distinctly commencing in the cardiac portion of the stomach; and from this its name is derived. As a scientific term, cardialgia ought to be limited to this affection. I cannot agree in the opinion, that the sensation is the result of spasm of the gullet. The sensation progresses from below upwards; but that can be explained by the passage of an acrid fluid from the

stomach to the mouth, as well as by spasm. It is very generally affirmed that a small quantity —a drop or two—of fluid issues from the throat, and that a most disagreeable bitter and pungent taste is afterwards experienced. From my own experience, I compare it with that of very rancid butter. This taste, and the circumstance that pastry and certain other articles which, more or less directly, yield butyric acid, are particularly apt to induce heartburn, show that acid to be its cause.*

Pain is a constant, but not an invariable symptom of dyspepsia, and in some, otherwise severe cases, no pain is experienced.

Dyspeptic pain may be practically divided into centric, or that of which the intestinal tube itself is the seat; and eccentric, or that which affects the parts more or less distant from it.

Pain at the pit of the stomach after meals is usually of a dull, aching character, and tenderness of the part is its usual accompaniment.

Flatulence has its peculiar pain; patients frequently speak of a "windy pain of the stomach."

* See Appendix A.

Neuralgia of the stomach is one of the most painful maladies, and it is sometimes so insupportable that it causes the patient to swoon.

It is difficult to say whether cramps, like those of the limbs, ever occur in the stomach; but pain bearing a close resemblance to that of cramp certainly does. Gout seems especially capable of producing cramp-like pains of the stomach.

Even if it were possible, it would be tedious and unprofitable to enumerate all the vagaries of dyspeptic pains. Those which shoot from the stomach as a common centre towards the spinal column, the shoulders, or lower angles of the shoulder bones, are amongst the most usual. Pain in the region of the heart, and in various parts of the chest, is also frequent. Nor is it affirming too much to say that pain caused by dyspepsia occurs in all parts of the body.

The headache of dyspepsia is of every variety, from the dullest and least defined to the most acute pain. Its position is equally variable. Sometimes the whole mass of the brain seems racked with anguish; at others it is confined

to the back or the front part of the head, to one or both eyeballs, or to the region of the ear; and in these cases the parts often feel sore on pressure. Great intolerance of light and noise is sometimes experienced, and increase of pain on stooping is peculiarly a feature of dyspeptic headache.

A practical division may be made of dyspeptic headache into that which occurs during, or very soon after digestion, and that which occurs after a considerable interval.

The first kind, often attended by nausea and other gastric symptoms, is manifestly connected with the state of the stomach itself. This form of headache is usually of a dull, confused character, and is sometimes accompanied by suffusion of the eyes, dimness of vision, a sense of general chilliness, and peculiar coldness of the feet. It rarely continues longer than a few hours.

We have an instance of the close nervous relations between the head and stomach in that sharp brow pain which attacks some people after eating ices.

The second variety, the severer and sharper

kind of headache, of which more is to be said hereafter, generally comes on the day following the meal which has caused it. From this relation of time, and because it is usually attended with tenderness over the track of the duodenum, it is highly probable that this form of headache is due to an unnatural condition of the upper part of the small intestine. In some cases, in which headache had been a prominent symptom, the duodenum alone presented morbid appearances on *post-mortem* examination.

A great variety of head sensations might be described as symptomatic of dyspepsia; but it is sometimes difficult to say whether these sensations are to be attributed primarily to the head or to the stomach.

A "swimming" or "lightness" in the head, dizziness or a sensation of motion while the body is still, and the same, with fear of falling or vertigo, are often experienced by the dyspeptic.

A burning sensation, generally referred to the vertex, and sometimes described as confined to a spot just under the skull, is not uncommon.

Occasionally the sufferers describe a tightness of the whole skull, as if an iron cap were compressing it; and this sensation, they say, is worse than actual pain.

Some patients complain of a trembling sensation over the body, but especially in the region of the stomach, which comes on when digestion has somewhat progressed.

The skin generally suffers in severe dyspepsia. A dry, harsh state of the integument is usual when the gastric mucous membrane is in an irritable condition, while in other cases the skin is greasy, from an excess of sebaceous secretion. Eczematous and other eruptions are common dyspeptic results.

A medical man who would omit to examine the tongue in dyspepsia, would justly be thought negligent; yet the importance of the examination should not be overrated. A clean tongue —by which is understood a condition of sufficient moisture, its surface being of a natural red colour—is one of the best indications we possess of a good state of the general health. In a word, this impressible organ is more an index of the general condition of the body than

of the stomach in particular. Any febrile indisposition, by which the pulse is raised and the secretion of the skin interfered with, commonly affects the tongue. It may be objected that the tongue is then affected through the stomach ; but in such cases we frequently find less direct evidence of gastric affection than we do of functional affections of other viscera. There are many persons, in all respects free from stomach disorder, in whom the tongue, especially on rising in the morning, is habitually foul. The habit of sleeping with the mouth open is often the cause. Exposure to air and the passage of the breath dries the tongue's epithelial covering, which takes the appearance of a brown coating. In fevers the same occurs in an exaggerated degree.

In general, nothing special can be arrived at by mere inspection of the tongue, but much may be learned from it in conjunction with other symptoms. Although the state of the stomach may not be clearly indicated, the amount of evidence supplied may correctly guide our treatment. The sum of medical experience largely consists in the right appre-

eiation of small but essential differences, too complicated or too minute for exact description in words.

The following are some well-marked morbid conditions of the tongue connected with dyspepsia. An unnaturally red condition of the organ is caused by deficiency in its epithelial coating, and indicates the same condition of the internal surface of the stomach. The redness is usually most marked at the tip; and when the papillæ situated there are prominent, its resemblance to a red strawberry is striking. As a symptom, no condition of the organ is more to be relied upon than this. An irritable condition of the stomach, as farther proved by tenderness on pressure at the pit, loss of appetite, and thirst, are generally associated with this strawberry-like tongue.

When the back part of the tongue is smeared with a creamy-white or yellowish coating, a foul state of the gastro-intestinal tube is indicated, and alkalies, mild mercurials, and purgatives do good.

A brown tongue is more generally associated with dyspepsia from temporary excess than with the habitual disorder.

When the tongue is broad, flabby, and pale, it indicates an anæmic and debilitated condition of the whole system, accompanied by weakness of digestion. It is not often foul in these cases, but owing to loss of elasticity and increased width, indentations made by the teeth on its edges may be commonly observed. Preparations of iron and the mineral acids are then the best remedies.

Sometimes the large papillæ (*papillæ circumvallatæ*), from fifteen to twenty of which exist at the back of the tongue, become very turgid. They look like inflamed warts, and are usually associated with severe and long-existing dyspepsia.

A foul streak may be often observed along the middle part of the tongue's upper surface, while the edges are clean; or, *vice versâ*, the middle part is clean, while one edge is coated, or both edges are in that condition. No great importance is to be attached to these variations. They can generally be accounted for by the mode in which the organ comes into contact with the mouth and its contents. Thus, when, owing to the state of the teeth, the patient is

compelled to eat at one side, it is easy to point it out from inspection of the tongue alone; it is cleaner at that side than at the other. Island-like clean spots are sometimes seen in the midst of the coating: they are the seats of former ulcerations, or else patches of psoriasis, and are due to loss of the epithelial covering.

Fissures of the tongue are frequently dependent on digestive disturbance. These solutions of continuity are most common in dyspepties of dissipated habits, and profuse bleeding is sometimes the consequence.

White patches of lymph or aphthæ, often beginning as minute pimples, are common to the mucous membrane of the mouth and to the tongue; their favourite seat is the sides and under parts of the organ, as seen when the tongue is protruded, or else on the inside of the mouth, near the junction of the lips. After some days, the patches attain their full size, and then disappear, often leaving troublesome ulcers in their place. According to my observation, aphthæ generally indicate acidity, and the gouty tendency. That fatal disease, chiefly

occurring in hot countries, of which an aphthous condition of the digestive tube is the leading symptom, is not included in the present consideration.

The throat is often affected in dyspepsia, and attention is commonly drawn to it by complaints of a slight soreness or stiffness, as if the mobility of the parts was impaired. On inspection, a turgid state of its vessels is generally observed; and the space between the tonsils is seen to be occupied by tenacious mucus, which the patient fruitlessly endeavours to expel. Another condition of the throat may often be noticed: it is dotted over by small pimple-like elevations of the mucous membrane. Relaxation of the uvula is constantly associated with these conditions.

Certain symptoms connected with the sense of taste deserve notice. They are connected with the state of the saliva, and the latter is probably always affected secondarily when the stomach is disordered. It is even possible that certain forms of dyspepsia may be due to defects of the saliva, of which we as yet possess no exact knowledge.

A sour taste is the most eommon of these symptoms, and its gastrie eonneetion is so marked, that a *sour stomach* is the popular phrase for it; in sueh eases, the saliva when tested is sometimes found to be aeid, a state of the seeretion destruetive to the teeth. A bitter taste is not uneommon, and is generally assoeiated with eonstipation. Oeeasionally, we hear a sweet taste eomplained of, and this is usually accompanied by an inereased secretion of saliva. It is symptomatie of stomaeh disorder, but its particular indieations are not elear. It seems to have no eonnection with diabetes; for although a saeeharine smell of the breath is usual in this disease, sweetness of the saliva is not eommon, nor is sugar found in it. Clamminess of the saliva, with an unnatural sense of heat in the mouth, espeeially on awaking in the morning, is a eommon dyspeptie symptom.

There is mueh miseoneeption about the conneetion between eonstipation of the bowels and dyspepsia. By many persons the two affeetions are regarded as identieal; and it is eommon to hear a dyspeptie say, "My digestion must be

all right, for my bowels are quite regular." On the other hand, simple constipation is commonly called "indigestion." But although generally associated, the one may exist independently of the other. It will be hereafter shown that the tendency to constipation varies with the particular kind of dyspepsia present. The opposite condition of the bowels is also a symptom of dyspepsia. In foul digestion, if the undigested matters are not thown off by vomiting, diarrhœa generally ensues. Putrefactive changes are the cause of this.

We are now and then consulted on account of a very troublesome kind of looseness of the bowels. They become disturbed after each meal; and the connection of cause and effect is in some instances so close that the person is compelled to rise precipitately from the breakfast or dinner table. There may be no indication of stomach disturbance; but the intimate relation between the stomach and lower bowel is thus proved. The commencement of digestion in the one is the signal for increased peristaltic action in the other. It happens, ordinarily, that the weakened action of the

stomach produces its counterpart in the colon, the result being constipation.

A very important but neglected source of knowledge lies in the condition of the fæcal evacuations. There is a natural repugnance to their examination, but everything should yield to scientific necessity. For chemical tests, the fæces are not so available as the urine, but even careful inspection is often a great assistance; and by the aid of the microscope important results may be obtained. The size, shape, and consistence of the fæcal masses afford useful information. Pellet-like lumps of fæcal matter are formed in the colon by spasmodic contraction of its cells. Small elongated and flattened portions of fæces are formed by a spasmodic action of the rectum, and sometimes cause alarm from the idea that they are due to organic stricture.

The fæces in dyspepsia often have this peculiarity. They sink in water, because the gases which ought to be mechanically retained in them are wanting.

Scantiness or redundancy of bile is announced by the degree of brown colour in the fæces. In

some forms of dyspepsia a more or less black colour of them occurs, and a peculiarly offensive odour usually accompanies this.

With the naked eye alone we may frequently learn a good deal of the composition of fæces, and the nature of the food from which they are formed. Occasionally we may see the latter nearly unchanged, as in lientery—that form of diarrhœa in which the digestive functions are almost suspended. Husks of seeds, kernels, woody fibres, pieces of bone and gristle, fragments of arteries, and other indigestible *débris*, may be commonly observed, and naturally go to form the fæces.

Substances too minute for recognition by the unaided eye, yet present in quantities sufficient to have caused bad effects, are easily determined by the microscope. The ripest pears abound in gritty and wholly indigestible particles, which are easily detected by their peculiar cell formation; and so it is with many other substances. By this method something may be also learned of the derangement of particular functions: thus the detection of starch granules would prove the imperfect digestion of this

aliment, since these particles are not found in healthy fæces.

The presence of worms in the intestines has been determined by the microscopic discovery of their eggs in the fæces.

A great deal may be gathered from the state of the dyspeptic's urine, but my limits will not allow justice to be done to this extensive subject. In all refractory cases, careful and repeated examinations of the secretion, by the precise and various means which science has placed at our disposal, are indispensable. Sometimes the determination of sugar or of albumen clears up doubts, by showing that the dyspepsia is but secondary to a graver disturbance of the general system. But when dyspepsia is itself the primary disorder, much that is important to diagnosis as well as treatment may be obtained from the examination. Thus, a deposit of uric acid forbids the use of acid remedies; on the other hand, a deposit of phosphates forbids the use of alkalies. A brickdust-like deposit of yellowish lithate of ammonia is a common result of dyspepsia; it generally occurs during an aggravation of the

disorder, or as a result of dyspepsia, from impropriety of diet. Red lithate of ammonia is almost invariably the result of a febrile or inflammatory condition of the system. Pink lithate is rare, and indicates disease of the liver.

Crystals of oxalate of lime are abundant in the urine of many dyspepties. They are found especially in that of hypochondriacal, irritable, and nervous patients; and Dr. Prout believed in the existence of a true oxalate of lime diathesis. But all who have had much experience in the examination of urine are aware that oxalate of lime is frequently present, without any associated symptoms.

It is well known that it exists ready formed in some articles of food, as rhubarb-stalks, tomato, &c., while many other articles, as sugar, yield it freely from their elements. While, therefore, a considerable and persistent deposit of oxalate of lime must be recognised as a symptom of a severe form of dyspepsia, it is unimportant when occurring in minute quantities, or only at intervals.

An alkaline state of the urine, with a deposit of phosphates, is common in dyspepsia; and

then it not unfrequently happens that, in addition to flatulenee and nausea, there is marked acidity of stomaeh. Here the state of the urine is an important guide to treatment, as the mineral aeids, eontrary to what might otherwise be expected, are generally found useful.

For some hours after a meal the acidity of the urine is constantly diminished, so that it may beeome neutral, or for a short time even alkaline. In conneetion with dyspepsia, this is an interesting matter, and further observations may yet lead to important praetieal results.

A persistent exeess of urea in the urine is a common aecompaniment of stomach disorder. I have seen some well-marked instances of this excess in cases of organic disease of the stomach.

In several cases of dyspepsia in men, a symptom exists which seems to have been overlooked by writers on the subjeet. It is a sensation in the urethra variously deseribed: in some instances as a mere uneasiness; in others, as a scalding or smarting, either when urine is being passed or at other times; or, again, as in

a case I once met, there was "a constant sensation of something which ought to come away." In this case the patient was habitually constipated, and he experienced the urethral annoyance most when the bowels were distended with gas. It is certain that this symptom is quite distinct from the irritation caused by the passage of urinary deposits; it is sometimes associated with urethral discharge.

The generative functions suffer severely. Spermatorrhœa is occasionally not merely kept up, but induced by dyspepsia.

The connection between the lungs and the stomach, by means of the pneumogastric nerves, is so intimate, that the suffering of the one is very frequently transmitted to the other. There is generally some truth in wide-spread and traditionary ideas, and one is preserved in the popular term "stomach cough." The stomach disorder which frequently accompanies chronic bronchitis, as well as the vomiting which occurs in advanced phthisis, teach us how the lungs may affect the stomach. But on this subject great mistakes are constantly made. We too often find that a cough which is caused by

serious disease of the lungs is by the patient supposed to be "from the stomach."

On the other hand, although there is often more difficulty in deciding the point, we meet cases in which the stomach as certainly affects the lungs. The association of cough with stomach symptoms, and the absence of local cause, proved by physical examination of the lungs, will aid diagnosis essentially. Stomach cough is usually of a short, dry character, unattended by expectoration. It must not be lost sight of that the dyspeptic conditions of the throat, and especially of the uvula, already described, are also productive of cough.

Asthmatic symptoms, and difficulty of breathing in general, are amongst the most usual indirect effects of dyspepsia; nervous influence is often concerned, but mechanical pressure of the flatulent stomach against the diaphragm has also much to do with these.

The circulation of the blood is often disturbed in a violent and sudden manner. By far the greater number of what are called functional diseases of the heart are referable to dyspepsia. Palpitation and intermittent

action are usual symptoms; sometimes the action of the organ seems temporarily arrested, and only recovers itself by a struggle. This symptom frequently attacks the patient when in bed, and causes great alarm. The best remedy is a draught containing ammonia, or brandy.

Throbbing of the arteries is common, and, when combined with a hot dry skin, constitutes a condition resembling fever. A remarkable instance of local excitement in the circulation happens in that form of dyspepsia which depends on an irritable condition of the mucous membrane of the stomach. Throbbing at the pit of the stomach is experienced; and if the hand of the observer be pressed upon the part, strong pulsations of the abdominal aorta may be felt, although the heart itself may be tranquil.

There are few people who are not familiar with an affection popularly called "fidgets," either from having experienced it themselves, or, what is almost as disagreeable, from having witnessed its effects in the person of a friend. It consists of an uncontrollable tendency to

motion in the lower limbs, the position of which the patient continually changes, accompanied by a sense of fatigue and a strong desire for rest. No one can exactly describe the sensations experienced, but all agree that they are distressing. This affection is a common result of dyspepsia. It comes on after dinner, almost invariably, and especially should fatigue have been previously incurred.

Another singular sensation that I do not hesitate to refer to dyspepsia, is the fancied unnatural size of the limbs or other parts of the body. Although a common affection, it has not been described by any previous author. It generally comes on at night when the patient awakes, disappears on moving the affected part, and after reflection has corrected the erroneous impression. I have met an instance, however, in which the delusion continued during the day. One or other of the limbs, or even the head, is felt to be of gigantic proportions; the hand to rival that of an Egyptian colossus; or the head, that of the Sphinx itself. Sometimes the tongue alone is affected, and then the patient has the sensation of the tongue being far too large for the mouth.

That dyspepsia will not only disturb but pervert the senses of sight and hearing, is well known to those who make these functions a special study. The patient may be simply deaf, or may at the same time fancy that he hears all sorts of sounds; such as the ringing of bells, beating of drums, or the thumping of hammers. Simple dimness of vision may be complained of, or imaginary objects seen. One of the commonest results of stomach disorder is the appearance of dark bodies or flies (*muscæ volitantes*), close to and in front of the eyes. Flashes of light, transient darkness, and actual spectra, all own the stomach as their source.

Many dyspeptics suffer intensely from various mental affections; others, on the contrary, are entirely free from these symptoms. It is remarkable that mental affections prevail most in cases where other, and especially stomach, symptoms are least marked. Physical conformation has much to do with these differences. The man of nervous temperament is proverbially more a prey to morbid mental impressions than the lymphatic; the sanguine more excitable than the bilious. But outward

appearance is not to be always relied on. A robust exterior is often associated with a depressed or even disordered mind. It is not difficult to conceive how the mental powers become affected by dyspepsia. The brain or connecting link between the material and the immaterial worlds is physically affected. The exact nature of the connection we cannot hope to comprehend. A barrier is here presented against our researches, impassable as the broken bridge in the "Vision of Mirza."

It is only when the patient begins to regard his professional adviser as a sympathising friend that any allusion is made to his mental troubles. So variable are these troubles, that nothing would be more difficult than to describe them. They embrace simple obtuseness and confusion of thought, indecision of purpose, and total inability to fix the attention. In extreme cases, all that constitutes complete prostration of mind is experienced.

On the other hand, a morbidly acute and over-sensitive mental condition is very common. The patient feels undue anxiety on every subject; is absurdly alive to the slightest

touch of ridicule, and finds insult where none was meant. He is constantly apprehensive of danger; and, if his mind dwell on religion, sees in it nothing but dark threatenings unrelieved by a gleam of hope. But worse than all, are fears and forebodings about health. Sometimes the mind becomes concentrated on a particular organ, often on the stomach itself, and the effect of this is highly injurious. A condition of causeless irritability seizes upon some sufferers, accompanied by a peculiarly distressing sensation: which, as far as I have been able to form an opinion, is a sort of consciousness of the operations of the mind, as if it were external to itself.* Associated with this, there is a sensation of oppression in the head, frequently ending in headache.

Insanity may be excited in those pre-disposed to it by dyspepsia. Here, as in other cases, extremes meet; and I have myself

* It has been well observed, that when digestion is perfect, we are not conscious that we possess a stomach. It is, in fact, from the action of disease that we become conscious of the performance of many of our functions which then are felt irksome. Close observation leads me to believe that the functions of the brain are not in this respect exceptional.

known instances in which the most complete dyspeptic depression has suddenly changed to excitement. Sometimes an ungovernable, or even a vicious impulse is experienced.

A general sense of weariness, heaviness, or sleepiness, without adequate cause, is a very common complaint with the dyspeptic. He experiences all the sensations which over-exertion of body or mind produces. But there is this marked difference: the sense of fatigue, which is merely a symptom of dyspepsia, is in general diminished by real exertion. We sometimes see remarkable instances of this. Thus, a patient may in perfect seriousness declare that he is unable to walk even a short distance, and yet be presently found engaged in some athletic sport requiring unusual muscular exertion. Another who has complained of such a degree of mental prostration, that it was a trouble to *think*, will immediately afterwards excel in some abstruse argument.

Sleeplessness is an ordinary effect of dyspepsia, and heat and dryness of skin are its usual accompaniments, especially if a late supper has been taken. There are few who

have not experienced a night of discomfort from this cause. The feet are so hot that the patient keeps constantly moving them in search of a cooler position, the hands are dry and burning, the mouth parched, the mind incapable of repose, and the weary hours drag on until sleep, if it does come, ensues from mere exhaustion.

The confirmed dyspeptic suffers in a different way. Sleep comes at its accustomed time, but does not bring with it real repose. Dreams in which fear, distrust, and other disagreeable emotions take a leading part, make a mockery of his rest. Nightmare, with its horrors of overwhelming waves, falls from precipitous heights, infuriated bulls or implacable monsters, are generally traceable to an enfeebled stomach. The same may be said of talking during sleep, and of somnambulism itself. Grinding the teeth in adults seems to belong especially to gouty dyspepsia, and is sometimes so habitual that the organs are worn by the friction.

CHAPTER III.

ACCIDENTAL DYSPEPSIA.

HAVING traced the causes and the symptoms of dyspepsia, I now proceed to describe the various forms of the disease itself; taking first those which may be termed accidental, because they are produced in the healthy subject by accidental causes.

It may be safely affirmed, that every one has suffered at one time or another from transient difficulty of digestion. Who is not conscious of having experienced bad effects from one of the following causes?

Simply eating in too large a quantity.

Indulging the appetite with too great a variety of food.

Partaking even moderately of a single kind of food, against which there is a constitutional repugnance.

Now, as is plain enough, these causes are likely to be mixed together, and the symptoms which result will often be more or less confounded. However, sufficient distinction usually exists to admit of their being so grouped as to constitute three distinct forms of dyspepsia.

If dyspepsia occur in a healthy person from eating too largely, but without deviation from accustomed diet, he is apt to be troubled as follows :—There is a sense of weight, fulness or other uneasiness in the stomach. Flatulence frequently succeeds, but the eructations are tasteless, as carbonic acid is chiefly the gas evolved. Sleep is likely to be disturbed, and nightmare or palpitation of the heart to ensue. Here we have the simple effects of more material than is required for the sustenance of the body. Digestive trouble is produced by *relative* deficiency of gastric juice, the delay of food in the stomach giving rise to fermentation, and fermentation to flatulence. This effect of repletion is very favourably regarded by some Asiatic nations. The noisier the escape of gas from the stomach, the better the breeding of

its proprietor, and the greater the compliment from the guest to the entertainment of his host.

Even amongst people who are careful not to take too much at a single meal, this kind of dyspepsia is frequent, and may become chronic. In these cases the meals are taken without sufficient intervals between them, or else the quantity of food consumed is as a whole too great. Perhaps a late and substantial breakfast is succeeded by a meat luncheon, and dinner is followed by a heavy supper. To supply the waste of the body, so much material is seldom required, and still more seldom taken without injurious consequences.

The dyspeptic attacks produced by mental emotion, by exercise after a full meal, by the hot or cold bath, or by any cause that violently disturbs the balance of the circulation, are similar to that just described, and may be classed with it.

In these cases, sudden disturbance of nervous force, congestion, or deprivation of blood, throws the digestive organs out of working order. Such are instances of the rapid production

of dyspepsia from accidental incompetency of the organs themselves.

The following is an example of the second kind of accidental dyspepsia : popularly it would be termed a " bilious attack."

A great variety of those dishes which luxury has made inseparable from a modern feast, —soup, fish, rich entrées, sweetmeats, fruit fresh and dried, nuts, &c.,—with an almost equal variety of wines and liqueurs, are taken. Nevertheless, the total quantity of food may not be in excess. The immediate effects are less marked than in the preceding kind of dyspepsia, but retribution follows. Sometimes, and particularly in children, there are nausea and vomiting. If the last has not happened, a restless and feverish night is passed ; or, if sleep comes on, it is troubled and fitful. Towards morning the patient sleeps heavily, but wakens to begin the business or pleasure of the day more fatigued than when he retired to bed. There is a foul taste in the mouth, and an unnatural sensation of heat causes a craving for cold water ;—soda-water, from its coldness and sedative nature, is often substituted. Slight

headache is felt; and constant eructations give great annoyance, the flavour of which is well compared by the patient to rotten eggs. The headache, which is chiefly in front, is worse on rising from bed, and increased by stooping. Breakfast is almost untouched, the bowels are unmoved, and the pain and discomfort continue until dinner-time; then, if food can be taken, relief sometimes immediately follows. This relief after taking food is analogous to what occurs in another instance. A stimulating draught is the best remedy after excess in drinking; and "a hair from the dog which bit you," is the vulgar but appropriate term for the remedy.* But very often the symptoms are more severe; the headache is excessive, and described as "splitting the head." There are nausea, and vomiting of foul-smelling, frothy material, in which yesterday's dinner may be recognised. Severe retchings ensue; and at last bile, almost pure, makes its appearance.

* In the *Medicina Statica* of Sanctorius the same advice is given, as follows:—

"*Si nocturna tibi noceat potatio vini,*
Hoc tu mane bibas iterum et fuerit medicina."

After the stomach distress, relaxation of the bowels often happens.

The taste and smell of the eructations, and the time at which symptoms occur after the meal, prove that the fermentation in the stomach is of a kind totally different from the preceding.

One, at least, of the gases evolved is sulphuretted hydrogen, and to this the fetor is due. It would be useless to waste time in speculating on the remote causes of this form of dyspepsia; but why, we may ask, should a great variety of food be more productive of it than the same quantity of any one, or a few of the same articles?

The clue lies in the fact that different secretions are employed in the digestion of different elements of food, and that food, although consisting of the same elements, may differ much in digestibility. When, therefore, the articles taken into the stomach are both numerous and varied, great digestive confusion results. The gastric juice reduces the substances easiest of digestion, leaving others comparatively unaffected; while these, under the influence of heat

and moisture, rapidly undergo changes allied to putrefaction.

What causes alleviation after dining? This appears to me the explanation. The stimulus of newly-arrived food causes the stomach and duodenum to contract, whereby offending matters are expelled; and the antiseptic properties of gastric juice, freshly drawn out by the same stimulus, assist by neutralizing the semi-putrescent remnant.

Habit reconciles the digestion to changes of diet which were at first repugnant. People suffer sometimes from the kind of dyspepsia just described, at the outset of continental travel; but afterwards, although the diet is the same, the stomach becomes accustomed to it, and ceases to suffer.

The third variety of accidental dyspepsia may be thus exemplified. Healthy persons sometimes tell us that *certain things* "disagree with them," and it may be a single article of diet that so affects them. It would be impossible to enumerate all these peculiarities. Substances of reputed indigestibility are generally, but not invariably, the offenders. Many declare they

can digest anything but pork, but I have known the same complaint made against mutton; others cannot take fat of any kind, or pastry, without bad effects.

The symptoms in these cases are various. A foul taste in the mouth, nausea, and vomiting, are probably the most frequent.

There is one symptom which deserves particular notice. An eruption appears on the skin after eating some particular article of diet. It sometimes assumes a partial and eczematous form, and vesicles crop out round the lips: more frequently it is diffused over the body as urticaria, or nettle-rash. This affection, the name of which is very descriptive, usually comes on within a couple of hours after eating the food which causes it. Sometimes the face, especially about the eyes, is swollen, as well as intensely red, and the itching of the body is often very distressing. A smothering sensation, unnatural heat, thirst, general febrile disturbance, nausea, and vomiting accompany severe attacks of nettle-rash.

A number of articles are known to be especially productive of nettle-rash, as oatmeal,

cucumbers, mushrooms, all shell-fish, and more particularly mussels. I know a lady who is always affected with an eruption on the face from eating lobster; and a gentleman in whom the same thing is produced by taking vinegar. But the most severe case of nettle-rash I ever saw was that of a young woman, from eating mackerel. An alarming degree of prostration alternated for some time with violent palpitations of the heart; and the entire skin, except where marked with wheals, was of a vivid red colour.

Taking water charged with lime cause irritation of the skin in some persons.* The sympathy between the lining membrane of the intestinal tube and the exterior of the body, between skin and mucous membrane, is highly interesting, and helps us to understand the

* That a similar effect may be caused by the external contact of impure water, the following extract proves:—

"We repaired to a neighbouring well, and found the water so hard that it raised lumps like nettle-stings in the bather's skin. The only remedy for the evil is an unguent of oil or butter, a precaution which should never be neglected by the African traveller."—*First Footprints in East Africa*, by Lieut. Burton, p. 232.

dependence of certain chronic skin diseases on confirmed dyspepsia. A simple transfer of irritation from mucous membrane to skin seems to be all that happens in some cases. A general disturbance of the system at other times associated with the irritation shows that the blood itself is affected. The highly deleterious effects of some articles of food—as sausages which have undergone certain changes—appear due to an action in the blood analogous to fermentation.*

Dyspepsia induced in healthy persons by unwholesome food, or by simple though coarse and unaccustomed diet, will come under the head just considered.

* "The singular sausage poison of Wurtemburg is an animal matter in a peculiar state of decay, and does not contain any poisonous compound, only a poisonous *state* or *condition*."—*Gregory's Handbook of Organic Chemistry*, 4th ed., p. 42.

CHAPTER IV.

HABITUAL DYSPEPSIA.

What has been said about accidental dyspepsia must be borne in mind and applied in considering habitual dyspepsia. The relation between them is of the closest kind; the difference is mainly this: in the habitual disorder an increased susceptibility in the organ leads to a constant repetition of digestive disturbance from slight causes, and this constitutes a true chronic disease. It is noticeable, that dyspeptic symptoms, when chronic, are usually less severe and urgent than when the same symptoms occur in the accidental form. Thus, the vomiting and retching of a mere surfeit are

generally more aggravated than when they constitute symptoms of confirmed dyspepsia. Sometimes, indeed, the disease comes on so gradually, and continues so long undeveloped, that we find difficulty in determining its existence, and common sense can alone decide.

Thus, if a moderate indulgence of appetite is habitually followed by sensations like those caused by excess in a healthy person, it is plain that something more than amount of food is at fault. If the repugnance of the system extends to a number of ordinary articles of diet, there must be more than mere idiosyncrasy in question. The same argument applies to other causes of accidental compared with confirmed dyspepsia.

Habitual dyspepsia consists in the frequent occurrence of uneasiness or pain after taking an ordinary quantity of digestible food.

In every science some classification of the subject treated is desirable. Practical inferences are greatly facilitated by grouping together the important facts in each case. Various divisions of chronic dyspepsia have been made by authors, but they all appear wanting either

in distinctiveness or in comprehension. At first it might seem that the best basis of classification was to be derived from considering the derangements of the separate functions of digestion. But in the present state of knowledge the subject presents great difficulties. We are not always able to distinguish clearly between such derangements, and, besides this, more than one function may be at the same time involved.

In order to avoid the evils of speculation and the substitution of theory for facts, a more practical course is desirable. A classification deduced from close observation of the various symptoms of dyspepsia, and of the manner in which they group themselves, seems to me more worthy to be relied upon. No classification can be perfect; but this has the merit of convenience, and need not be adhered to in an absolute manner.

According to my observation, five kinds of habitual digestive derangements are to be plainly recognised. They are named as follows; partly from their essential natures, and partly from the symptoms which characterize them:—

Slow Digestion—or Simple Dyspepsia.

Undue Acidity in Digestion—Dyspepsia with acidity.

Painful Digestion—Dyspepsia with gastric pain; and soreness on pressing the stomach.

Foul Digestion—Dyspepsia with fetid eructations.

Impaired Digestion, with Mental Disturbance—Dyspepsia in which mind symptoms predominate.

Slow Digestion.

This constitutes the most common form of dyspepsia. It is the bane of those who ignore natural laws, and forget that the healthy action of the stomach is dependent on the condition both of body and of mind. Those whose pursuits oblige them to pass much of their time within doors—men of letters, and of business, whose minds are seldom perfectly relaxed; administrators, speculators, and the various professional men, whose callings chain them within the excitement of London life—fall ready victims to it. Women, as might be expected, are less liable to this disorder than men.

It occurs in all habits of body, but oftenest in persons of an irritable or anxious aspect, popularly recognised as "dyspeptic looking." It is comparatively unknown amongst those who associate even a free indulgence at table with the healthy pleasures and pursuits of the country. Eating too rapidly is a common exciting cause of the disorder; as is also imperfect mastication from loss of teeth.

This kind of dyspepsia, in its milder degrees, most resembles the effects upon the healthy stomach of more food than the system requires; but there is this notable difference: in the diseased stomach the requisite amount of nutriment is with difficulty digested. "I should be quite well if it were not necessary to eat," is a common statement. A dinner not exceeding ordinary limits is followed at varying intervals, but usually within an hour, by a feeling of weight and oppression in the stomach. For several hours afterwards the patient experiences discomfort, which in some cases subsides before bed-time. Should even a light supper be indulged in, nightmare or troubled dreams are almost certain to result. The symptoms vary

in number as well as severity: sometimes there is great flatulence, accompanied by shooting pain in the stomach. Undoubtedly in these cases the gases are products of fermentation, and the eructations, consisting chiefly of carbonic acid, are tasteless. Palpitation and irregularity of the heart, coming on principally during the night, frequently cause great anxiety. Constipation often gives trouble, but by no means invariably, for a common statement made by patients is, "I can hardly suffer from indigestion, my bowels are so regular." In some cases the tongue is foul, especially on awaking in the morning, but in others that organ is little, if at all altered. The appetite may be as good as in health; in some instances, indeed, it seems greater.

All the symptoms of this form of dyspepsia are referable to undue delay of food in the stomach; the immediate causes of the sense of oppression have been already considered.

Here is a typical case.

A man of middle age, busily engaged in commercial pursuits, consults us. His habits are temperate, and it would be difficult to per-

suade him that he is not in all things a man of moderation. Except for a slightly careworn expression, his face, naturally dark, looks healthy. But there is a restlessness about him, as if he thought it losing time to speak of his health. He says he has been from boyhood wholly engrossed in the routine of business. Improvement of fortune and perfect freedom of action brought with them no change.

He lives, or rather sleeps, out of town, and in consequence entertains a notion that no matter how he treats himself, he has no right to feel unwell. He manages himself in some respects as if he were an iron locomotive rather than a creature of flesh and blood; indeed, his principal movements during the year may be found on certain railroad time-tables. After an unsubstantial breakfast he hastens to catch a train by which he invariably comes to London. Ten o'clock begins the business of the day, which is steadily persisted in until one. He now leaves his office for a short time, and swallows hurriedly, rather than eats, a chop—on busy days he has no chop, and no substitute for it.

At seven o'clock our patient sits down to dinner. He has then a feeling of exhaustion, which a glass of sherry somewhat lessens. He eats largely of various dishes, including pastry, and perhaps takes malt drink freely, winding up with a fair allowance of port. Soon after dinner his troubles commence, but not always to the same extent. On bad days he suffers from an almost intolerable sense of weight and tightness about the stomach. This causes him to unbutton his waistcoat, but he finds little gained by it. He paces the room, and beats or chafes over his stomach, in the vain hope of getting relief. Very soon his stomach might be compared with a windbag of Æolus. In vain he struggles to expel the gas, and at length sinks exhausted into a chair. Hot tea is now swallowed freely, as he fancies it gives relief by displacing the gas.

Our patient further states that he sleeps heavily, though uneasily—that he wakes in the morning unrefreshed, and is very averse to rising—that his mouth is clammy and his tongue covered by a creamy coating. He also

notices that his urine often contains a thick reddish brown or yellowish sediment.

Undue Acidity in Digestion.

That form of dyspepsia in which acidity is a prominent symptom must be regarded as a more serious disorder than mere slowness of digestion. We have now depraved secretions to deal with; there is a sour taste in the mouth, either constantly or at intervals. In some cases the saliva has an acid reaction; acid eructations occur, and even the breath may have a sour smell. This general condition is greatly influenced by the nature of the food. A diet consisting chiefly of vegetables is much more productive of acidity than one mainly of animal food. The appetite is generally very bad; farinaceous food is ill borne, yet there is often a loathing of meat. Flatulence is in some cases troublesome, while in others it is not complained of.

The chemical explanation of an unnatural production of acid from farinaceous food is reasonable. By the natural functions, starch is converted into sugar; while, by fermenta-

tion, a process foreign to the organism, the sugar becomes acetic acid. This acid is, however, by no means the only one which is abnormally present in the stomach; and marked acidity is sometimes found to exist after an exclusively animal diet. It was, therefore, long ago maintained by Dr. Graves, that acidity was caused by undue secretion of the natural acid of the stomach, which he affirmed to be lactic acid.* The question is a difficult one; but it will probably be found that the acidity of dyspepsia is derived partly from fermented food, and partly from secretion.

According to my experience, acidity is a prominent feature in two very opposite habits or states of constitution. One is characterised by debility—the anæmic tendency, and a general want of tone; in the other, plethora is more or less marked, and the vital functions are vigorous.

Generally speaking, the acidity of the plethoric class indicates so-called gouty dyspepsia. Yet the aspect of some gouty patients closely coincides with that of the pallid and weakly

* Clinical Lectures, edited by Dr. Neligan, vol. ii. p. 209.

subjects of acidity. Gout is greatly modified by the constitution of the patient, and in robust persons has a tendeney to expend itself in inflammation. The word *expend* is used because, after an inflammatory attaek, relief of the dyspeptie and other symptoms is commonly experienced, and from this an impression has arisen that a fit of the gout does good. On the other hand, inflammatory gout is less frequent in delicate people than in the robust, and in women than in men. Probably all cases of dyspepsia with undue acidity have an alliance with gout, whieh is only developed when other circumstances are favourable.

A form of dyspepsia characterised by extreme acidity, accompanied by brain symptoms, and almost always terminating fatally, occurs in France.*

I shall now try to illustrate from my own experienee the forms of dyspeptie acidity commonly met.

The anæmic subjects of aeid dyspepsia are frequently found amongst hospital out-patients. Let us take an example: it is a languid-looking,

* Des Dyspepsies, par M. Chomel, p. 96.

ill-nourished woman of middle age. She is the wife of an artisan, has reared a family, and looks prematurely old. Her married life has been one of unvarying toil. Amongst other causes, suckling too long has injured a constitution originally good. It is not affirmed without reason, that she has never been so well in town as in the country, whence she came, but which she has not visited for years. Meantime, no autumnal change of air, no seaside sojourn has been her lot. More special causes must nevertheless account for unnatural paleness, and the dusky semi-circles beneath her dull eyes. She lives in an ill-ventilated house situated in a close court. Often, during the heats of summer, she turns in disgust from the window opened "for air," but which admits noisome effluvia from badly-constructed drains. Chained to domestic duties, she seldom gets out of doors. Her appetite is so bad that a bare sufficiency of ordinary food is taken with difficulty, and scanty means allow no indulgence of the palate. To avoid a painful sense of exhaustion, and to relieve headache, she is in the constant habit of drinking tea; and this, without solid food, is

often a substitute for dinner. What is most complained of is, that "every kind of food turns sour in the stomach." She is aware of this, from sour eructations and the taste in her mouth. Heartburn annoys her, and sometimes a small quantity of very disagreeable, rancid oil-like fluid rises to the mouth; vomiting of "stuff so sour that it sets her teeth on an edge," occurs occasionally, and is followed by temporary relief. She is always worse after vegetable diet: even bread disagrees with her. She wonders, too, that arrowroot, sago, or any farinaceous food, ever so carefully prepared, are especially unsuitable, although these articles have been recommended for her. The tongue is white and flabby, and its edges are indented by the teeth. The teeth themselves, discoloured and carious, are in a wretched condition—a circumstance to be attributed to the acid state of the saliva. The bowels are sometimes constipated, and sometimes relaxed.

Here is an example from a very different class of sufferers from acidity:—

He is a stout, rubicund, pleasant gentleman, in easy circumstances, and, although irritable,

at peace with the world in general. People regard him "as a picture of health," and often congratulate him on his good looks. And yet this gentleman is not without his sufferings: he has already felt the anguish of gout, and knows there is more of it to come. But notwithstanding occasional and even more permanent drawbacks, to be presently mentioned, he enjoys life famously. He dines freely off a variety of rich dishes, and drinks without stint old port and claret. On all these matters he is an authority at his club. He seldom suffers from weight or oppression after meals, but is sadly troubled by acidity. This comes on occasionally after any kind of food; but certain articles, such as fruit and pastry, are most productive of it. He tells you, "I know exactly what suits me—exactly what causes acidity, and what does not." Strange enough, however, it comes on day after day, although he says he is ready to make any sacrifice to get rid of it. The truth is, our patient is disposed to be dogmatical on the subject of diet, and looks with great suspicion on any interference with it. Advice on the subject must be very much in accordance with his

own inclinations, or there is little chance of its being followed. This makes it difficult to be of use to him. He complains of occasional oppression, fulness or confusion in the head, and has a habit of grinding his teeth during sleep. The bowels act regularly, and his tongue, although it may be foul on rising, recovers itself completely during the day. He notices "red sand" in his urine, and is liable to pain of the loins. These symptoms are regarded as constituting "gravel," and the dread of this disturbs him more than anything else.

Painful Digestion.

No kind of dyspepsia is better marked than that next to be described, and it is also a common affection. Pain, generally of a dull character, is felt after meals; along with the pain, soreness at the pit of the stomach often exists, and sometimes the soreness is permanent. The tenderness is commonly restricted to a spot in the middle line of the body, immediately below the breast-bone. In some cases, indeed, this spot can be covered by the tip of the finger; while, in others, it is much

more diffused. It often extends upwards under the bone, which consequently feels sore on pressure, or the tenderness is felt towards either side. When the right side is affected, it is usually in the direction of the cartilages of the ribs. It is frequently supposed in these cases that the liver is involved, but the duodenum appears to me the part usually at fault.

This tenderness is commonly associated with an unpleasant feeling of heat—"a burning sensation," as it is often termed by patients; "tearing," "rasping," "gnawing," "dragging," as well as various anomalous sensations under the breast-bone, are also complained of at varying intervals after taking food, but generally within a quarter of an hour.

As might naturally be supposed, the intensity of the symptoms is proportionate to the quantity and quality of the meal.

When the stomach is empty, a sensation of craving or emptiness gives most trouble. This often causes a false appetite, which, by inducing the patient to eat heartily, aggravates his sufferings. Thirst generally causes much annoyance; heartburn and water-brash, with or without

acidity, nausea, vomiting, and headache, are not unfrequent attendants. The state of the tongue is very characteristic. The body of the organ frequently presents a white coating, but its extremity is almost invariably redder than is natural; while its papillæ are prominent, and have a peculiarly irritable appearance. From mere inspection of such a tongue in the adult, we can with tolerable certainty predicate pain and tenderness at the pit of the stomach. In children this state of tongue must be less relied on, as, owing to the greater impressibility of the organ, it assumes an irritable appearance from trifling stomach disorders. In this form of dyspepsia the bowels are often quite regular.

The epigastric tenderness has been differently explained: some writers believe it to be due to mere irritability of the mucous membrane, while others ascribe it to chronic inflammation. If we consider how exposed the stomach is to injury from without, and still more to bad treatment within, we must conclude that it enjoys greater immunity from inflammation than any organ in the body. The stomach has been known to tolerate for years rough and

hard substances of considerable size. Even the effects of molten lead and boiling water have been for a time endured by this resistive organ. Concentrated mineral acids, or such strong corrosive agents, appear alone capable of producing acute and fatal inflammation of the stomach.

Unequivocal sub-acute gastritis, on the other hand, now and then occurs. Possibly, then, slight gastric inflammation, only manifesting itself in dyspeptic symptoms, may long exist without further development. A chronic inflammation of the mucous membrane of the eyelids is often met with, which, if not arrested by treatment, may continue for months or for years, and a similiar condition of the mucous membrane which lines the stomach may fairly be inferred. Few opportunities are offered of inspecting stomachs in which such changes are suspected, and after death it is not always easy to decide between the effects of inflammation and congestion. Inflammation accompanying ulceration of the stomach, an affection not only recognised with precision after death, but generally during life, is here excluded.

The question remains to be answered,—Is epigastric tenderness a proof of inflammation in the stomach? In the great majority of cases, certainly not. The natural susceptibility to the effects of pressure at this part of the abdomen varies considerably. In some healthy persons, moderate pressure is attended by a feeling of soreness. In most persons the pit of the stomach is a sensitive part. Even violent throbbing, coincident with tenderness, affords no proof of inflammation. Frequently in these cases the heart itself is tranquil, and the nervous relations between the stomach and the abdominal aorta are suffieient to explain the arterial excitement. We can generally identify the soreness caused by gastritis, by its being more continuous; by greater dryness of skin, more thirst, a quicker and harder pulse,—in short, greater disturbance of the general health than in eases of mere morbid sensibility of the stomach. This morbid sensibility may be reasonably explained. It seems to be occasioned by a deficiency in the epithelial lining of the gastrie mucous membrane. From some unknown cause the cells which compose this lining

are either formed imperfectly, or too rapidly removed. We have seen that the connection between the state of the stomach and that of the tongue is remarkable; and we know that the unnatural redness of the latter organ is due to deficiency of its epithelial coating.

This kind of dyspepsia is common to all classes, and to every constitution. But it attacks women more frequently than men.

Here is a typical case. A young gentlewoman of delicate conformation and of luxurious habits, makes the following complaint:—From ten minutes to a quarter of an hour after each meal, but especially after dinner, a dull pain of the stomach is felt; sometimes the pain is described as twisting or rotatory, and as being more violent. When the pain is severe, it is plainly indicated in the countenance, and worse, an eruption of small vesicles around the lips is liable to appear in a few hours after a bad attack. The appetite is strangely capricious. Forgetful of consequences, she indulges it freely at times, while at others she can scarcely be induced to take the needful amount of nourishment. Farinaceous substances agree better

than animal food, and certain meats, as veal, are partieularly injurious.

During hours of pleasurable exeitement, she often remains long without eating or feeling any want of food, but at other times suffers from sudden fits of exhaustion. A sinking sensation, aeeompanied by spasmodic pain of the stomach, eoldness of feet, and general ehilliness, sueeeeds; but a glass of wine, together with artifieial warmth, generally restore her. Noisy rumbling of gas in the intestines is also a souree of great annoyanee. Soreness at the pit of the stomaeh is felt from the slightest pressure, or on any sudden movement. Notwithstanding this, it is obvious that her waist is rendered smaller than is natural by an overtight corset. The redness of the tip of the tongue is so marked as to have arrested the patient's attention.

In sueh a case, late hours, over-exeitement, and not only negleet, but wilful breaehes of the laws of health, are the exeiting eauses of disease. Happily, better ideas are gaining ground amongst edueated women than prevailed even a few years sinee; tight-laeing, a fruitful source

of stomach disorder, has been condemned by good taste, and we may hope that other reforms may follow.*

Foul Digestion.

I have already spoken of foul digestion occurring even in the healthy, from eating a great variety of food at a meal, especially food of a rich nature. Like symptoms may occur when there has been no exciting cause of the kind, and we must then look for the cause in the digestive organs themselves.

Foul digestion is the kind of dyspepsia commonly known as *biliousness*. It chiefly attacks persons of sedentary habits, and it is probably for this reason that women are more subject to it than men. Tailors, shoemakers, and all who live by the needle, are its frequent victims. In the higher ranks of society it also prevails.

The evil of misuse of terms is well illustrated in this disorder. Nothing is more common

* It seems impossible that the reaction in favour of the health-destroying practice of making the waist small on any terms, which has very recently been revived in certain quarters, will gain general acceptance or anything more than ephemeral attention.

than for people to say they are "bilious," by which they must mean, if they mean anything, that their liver is disordered, and that bile is either secreted in deficient or excessive quantity, or of defective quality. But in fact no such distinction is contemplated, and it is rare that evidence of any of the morbid conditions mentioned exists. The so-called bilious attacks occur independently of the liver, while the stomach is the true seat of mischief. Medical men themselves employ the term bilious far too loosely. But measured by its consequence, the inaccuracy is by no means trivial. First, attention is diverted from the stomach, so that proper dietary precautions are neglected, and the evil is not checked at its source. A good example of this once occurred in the case of a lady who consulted me. She was subject to the kind of dyspepsia at present described, attended with headache, flatulence, nausea, and vomiting, which I had more than once assured her were not to be assigned to the liver. But the impressions of years were not easily effaced; she persisted in calling the attacks bilious, and in believing that her great

enemy was bile. On one occasion, however, it having come to my knowledge that she had eaten plum-pudding, &c., at dinner, I foretold an attack of "biliousness" for the next day. It may seem strange, but the connection between cause and effect had not been previously observed, or if it had, made no impression on her mind. But the matter was in this instance too obvious to be set aside, and she was fortunately at length convinced that since a "bilious attack" can be produced at pleasure, it may be at least sometimes avoided. A second source of great mischief to which the inaccuracy leads, is the indiscriminate use of purgatives. Biliousness is usually supposed to be caused by hindrance to the flow of bile, and the conclusion is that the liver requires stimulating. Hence that injurious swallowing of pills and draughts, of calomel, and colocynth, and aloes, and the still more injurious consequences which the whole tribe of patent antibilious remedies is daily inflicting.

In all the kinds of dyspepsia previously described, the symptoms appear soon after a meal; but in the present case, they usually come on

in the morning before food has been taken. The difference between foul digestion and that described as slow digestion is this. In the latter, the food being only partially reduced to chyme within the natural period assigned to the process, undergoes common fermentation. In the present form its reduction is delayed so much longer that decomposition proceeds further. This affection must of course be regarded as the more serious of the two. But it is a curious as well as a fortunate circumstance, that, unlike other stomach affections, the attacks are seldom quickly repeated. From the undigested condition of matters vomited after having lain in the stomach from twelve to eighteen hours, it is plain that its action must have been almost in abeyance during these long periods. If this were of daily occurrence, life could not be long sustained.

The symptoms vary greatly in severity. Fetid eructations, as might be expected, are common. More or less headache or giddiness is generally experienced, and severe throbbing headache is not unfrequent. Sometimes the centre of the brain, from which the pain

radiates in all directions, appears to be its seat; at other times it is confined to the forehead or to one or both eyeballs, but in every case the pain is remarkably increased by stooping. There is great nausea, succeeded by vomiting of half-digested foul-smelling food. After the vomiting has been frequently repeated, bile, sometimes in considerable quantity, mixed with mucus, is brought up. It is clear that the action of vomiting is then communicated to the duodenum, and here bile had probably been accumulated. Sometimes the immediate cause of the disorder seems to be obstruction in the duodenum, since a timely purgative will often avert an attack. Such an obstruction, by interrupting the passage of food out of the stomach as soon as it is reduced to chyme, would account for digestion being so greatly interfered with.

Occasionally there is neither headache nor vomiting; and in the latter case, unless diarrhœa comes on, the disturbance of health is not much protracted.

Although in this form of dyspepsia the bowels are often habitually constipated, diarrhœa

during an attack is usual, and is, more often than vomiting, attended by marked relief.

The intermittent tendency of this disorder is sometimes very marked. I remember the case of a gentleman, who was for many years the subject of severe attacks of the kind. They took place at intervals of from a fortnight to three weeks, and, being so habitual, never caused alarm; resigning himself to his fate, he remained in bed for the day or two during which his illness lasted.

The following is an instance of foul digestion.

Our patient is a stout gentleman, a public *employé*, and, both from necessity and choice, of sedentary habits. He is a *bon vivant*, a whist player, and a man of late suppers of the more substantial kind. He tells us, however, very complacently, that these things do not interfere with his health: he adds that he does not suffer from indigestion, but that he is "bilious."

Now, by the latter term is meant that he occasionally awakes in the morning, feeling slight headache. There is a disagreeable taste

in the mouth, and his tongue is so foul that he is obliged to scrape it. He is thirsty, too, at such times, and drinks water freely. In stooping over the basin, a number of phantom black spots are noticed floating between the bottom of the vessel and the eyes. Breakfast is scarcely touched, and all the symptoms gradually become worse. Eructations, the taste of which he compares to rotten eggs, annoy him. An almost insupportable headache, with nausea, followed by vomiting, ensues. The vomited matters at first consist of the contents of the stomach, and portions of the preceding night's supper may often be distinctly recognised. As the retching continues, matters which he compares to the white and yolk of egg, come up. These are mucus from the stomach, and bile from the source already mentioned. After some hours of suffering, the headache and other bad symptoms subside, and he finds himself the day following as well as if nothing had occurred.

The patient has ascertained that these attacks can sometimes be prevented. When he feels lethargic and drowsy, has a sense of

confusion in the head, and as generally happens is constipated, he takes a blue pill at night, and a black draught on the following morning. This plan, he says, sets him all right. But it does not occur to him that the preventive system would be infinitely better—that moderation in diet, and giving up suppers, would be more beneficial than having recourse to remedies, a repetition of which assists in keeping up the disorder.

Impaired Digestion, with Mental Disturbance.

Credit must be assigned to the late Dr. James Johnson for having strenuously maintained that dyspepsia may often be recognised by its mental symptoms alone. He pointed out that when digestive disturbance is least apparent, that of the functions of the mind is usually greatest.

Experience leads me to concur in this, although I do not accept his view, that morbid sensibility of the mucous membrane of the stomach and bowels is always the cause. There is often no positive proof of such morbid sensibility; and notwithstanding direct nervous

connections between the stomach and the brain, it would be erroneous to ascribe *all* the dyspeptic affections of the brain to gastric irritation transmitted by the nerves. It is true that in some instances head symptoms follow so closely upon stomach disturbances, that we must regard them as results of direct transmission. We know that conversely the stomach is affected by the brain; for, as previously stated, bad news may spoil a good appetite, or even bring on an attack of dyspepsia.

In many of the cases under consideration, physical symptoms are overlooked because of their slight nature. It will often be found on questioning a patient that he has an occasional sense of uneasiness in the stomach, with tasteless eructations, a sense of fulness in the head, great uncertainty in the action of the bowels, rather than actual constipation, that the fæces sink in water and have at times an almost putrid smell. A copious and persistent deposit in the urine of oxalate of lime is found in many instances. But from the fact that in some cases we can determine the disease to be dyspepsia from mental symptoms alone, we must

look for a cause of these symptoms in something besides irritation directly transmitted from the stomach to the brain. A fault in the preparation of chyle will afford the explanation, and it is plain enough that such a fault must be due to dyspepsia unattended by the usual local symptoms.

In the stomach and small intestines the sustaining elements of life are prepared. The sole purpose of digestion is to renovate the blood; the locomotive and secreting organs of the body, the nerves which direct their actions, the brain itself, to which we owe consciousness and the power of thinking, are only maintained in a state of health by the circulation of pure and well-nourished blood. If the blood be tainted by the absorption of ill-prepared nutriment, the most susceptible organ will suffer first, and that organ is the brain.

The presence of impure blood in the brain distorts or renders imperfect the impressions which it receives from the senses as well as the thoughts which arise within it. This, then, is the true cause of most morbid mental symptoms, and is the reason that dyspepsia can

be discovered from the condition of the mind alone.

We are surrounded by people who have cause enough for depression in the real troubles and anxieties of life. But if the health be sound, most persons learn in time to bear these with calmness and fortitude. The majority of the fretted and the anxious are invalids whose minds suffer acutely through their bodily weakness. A vast proportion of this suffering is caused by dyspepsia in the way described; and many people clearly connect a day of mental misery with indulgence of appetite on the preceding day. The patient may be free from head or stomach symptoms, but is listless and languid. He is unequal to the business of life, or indifferent to its pleasures. He will tell you that he is not sick in body, but that he is miserable in mind; and he is a fortunate man who is alive to the fact that his body rebelling at ill-treatment is really at fault. Nothing, indeed, is more important than to fix in each case the connection between cause and effect, and it then remains for the patient to display the necessary firmness in profiting by the discovery.

In aggravated cases these mental effects of dyspepsia become at length so established, that a state of mind is produced which continues to exist independently of exciting causes, and the patient becomes a confirmed hypochondriac.

The seat of hypochondriacism has been a point of dispute from the days of Galen to the present time. Writers of eminence have referred it to the brain; some to the blood itself; while certain abdominal organs, as the name implies, have been by others supposed to be its source. The stomach, spleen, liver, and mesentery have been in turn accused. Hypochondriacal affections are not uncommonly attributed to sexual indiscretions; and abuse of the sexual passion is certainly an exciting cause. But the effect of light on the eye, or of sound on the ear, can no more be questioned than the connection which exists between dyspepsia and hypochondriacism, and the mechanism of this connection has just been described. In this respect the disease may be compared with hysteria in the female, where the connection with the uterine system is generally plain. It is true, however, that

the diagnosis of hypochondriasis is not always easy. It is sometimes difficult to distinguish between it and that mental condition which is the index or forerunner of actual insanity.

For sake of convenience, all the mental affections which are results of dyspepsia will here be grouped together. There is, of course, a wide range between the most marked hypochondriacism, or virtual monomania, and mere depression of spirits; between the most active self-torment on account of an imaginary ill, or grossly distorted real annoyance, and that passive melancholy, or "tedium vitæ," equally incapable of being explained or defined.

Let us hear Dr. Cullen's quaint but graphic description of the hypochondriac. He says:—

"In certain persons there is a state of mind distinguished by a concurrence of the following circumstances:—A languor, a listlessness, or want of resolution and activity with respect to all undertakings; a disposition to seriousness, sadness, and timidity as to all future events; an apprehension of the worst or most unhappy state of them; and therefore, often upon slight grounds, an apprehension of great

evil. Such persons are particularly attentive to the state of their own health, to every smallest change of feeling in their bodies; and from any unusual feeling, perhaps of the slightest kind, they apprehend great danger, and even death itself. In respect to all these feelings and apprehensions, there is commonly the most obstinate belief and persuasion."

Hypochondriacism is stated by some authors to be a disease of middle and of advanced life, and as being apt to increase as life progresses. But many exceptions may be observed. Some old people tell us that, with advancing years, they lost their dyspepsia and their melancholy together. And, as already said, youth is more frequently oppressed by mental suffering than is generally supposed.

A feeling prevails that hypochondriacism is an imaginary affection, and that its painful impressions are under control of the will. On this account some persons look on it as a disgrace, and the physician who would plainly tell his patient that he was hypochondriacal would incur the risk of dismissal. The truth is, that like hysteria, the disease is capable of being

considerably controlled by vigorous exercise of the will, yet both are true diseases, and the sufferers in either case deserve sympathy and compassion.

One might fill volumes with the detail of sensations and of the perverted ideas of hypochondriacal sufferers. Some believe themselves slighted by their friends and the world; extreme sensitiveness makes others voluntary exiles from both. This is a very common form of hypochondriacism; the most groundless suspicions are excited in the patient's mind, causing him to fancy himself the object of ridicule or criticism. From this state of suspicion there is an easy transition to excessive irritability of temper—the bane of many dyspeptics. A combination of irritability and irresolution, often mistaken for bashfulness, is a common symptom. I have known instances in which patients declared their total inability to make up their minds on the most ordinary subjects. Fear of sudden death, or of death from some specific accident, makes others miserable. Lightning is the bugbear of many, and there are individuals to whom, from this cause, the most

agreeable part of the year is a period of trial and anxiety. Every "summer cloud" really "overcomes" them. No array of statistics to show the infrequency of deaths from lightning will here avail. The sufferer listens and would gladly be comforted, but his morbid terrors are stronger than any reasoning.*

The intrusion of unbidden thoughts is a common and very serious annoyance; such thoughts may, indeed, cause indescribable misery. In some cases they take a blasphemous form; at others they are wrong in a moral sense, occasionally they are merely whimsical, but are nevertheless the cause of

* It cannot be doubted that the electric disturbance which precedes or accompanies a thunderstorm has a specific effect on some constitutions. Individuals assert that their sensations warn them of an approaching storm when external indications are altogether wanting, as when in bed at night. I allude above more particularly to those cases in which inordinate fear of thunder and lightning, like other groundless apprehensions, is a manifestation of deranged digestion.

I knew a gentleman in whom fear of lightning was so strongly developed that it made him ill to mention the subject of electricity; and when a thunderstorm came on, he was always affected with a copious evolution of gas and other evidences of stomach disturbance. A specific electric agency, as well as fear, appeared to act in this case.

real suffering. Thus, in the case of a gentleman, related by Dr. J. Johnson, life was rendered miserable by the constant occurrence to the mind of a particular number which the patient believed to be in some way connected with his fate, both in this world and the next.

Those cases are especially difficult to deal with in which true conceptions are either painfully exaggerated or grossly distorted. This was exemplified in the following instance, which occurred within my own experience.

The patient was a clergyman, a man of advanced years, and, in all ordinary affairs, of sound judgment. He had been long an invalid, and, although not aware of it, was plainly dyspeptic. He complained of the constant domination of one thought. It concerned a matter of church discipline, not, as he was obliged to confess, of much real importance: yet suicide, as the only solution of it, was ever present to his mind.

There is a phase of religious despondency the subjects of which are generally of the same sex that from a like cause are frequent victims of insanity. Dyspeptic religious melan-

choly is common amongst women of educated and sensitive minds; and it may be asked, Why does not a truly consistent Christian education check, rather than induce, this manifestation of disease? Is it that the dark side of the picture is so much dwelt upon by some instructors that the dread of retributive justice outweighs, or even effaces, all hopeful contemplations?

Hypochondriasis very frequently takes a form which, for obvious reasons, comes more fully than any other to the knowledge of the physician. It is that in which the patient fancies himself the subject of some severe disease or combination of diseases. All medical men are familiar with the difficulty of managing these cases. Active treatment is out of the question, and the prudent practitioner must equally avoid the risk of offending the patient by "making light of his complaints."

One difficulty is, that pain or other uneasiness is often really experienced, for it has already been shown that dyspepsia is the source of morbid sensations in every region of the body. The nicest tact is necessary to reassure the patient without risking his

confidence. Mental relief is the first step towards a cure, and time is thus gained for the employment of general remedies.

It would be quite useless to attempt many illustrations of a disease, the varieties of which are innumerable. I will, however, give one from the class last considered, and most practical men will remember to have met such a case.

The patient is a tall, thin man, unmarried, and of middle age. Possessed of a cultivated mind, he expresses himself fluently and well, both in conversation and in writing. He has proved this in former consultations and in letters, by graphic descriptions of his sufferings. He is an agreeable, and can be an amusing, companion. No one casually meeting him in society could suppose that he laboured under any secret grief or physical suffering. But the man is in reality most unhappy. When alone, his thoughts are constantly fixed on himself; he notices and mentally records all his sensations. At one time he fancies that he has disease of the heart, at another of the lungs, then of the

liver or of the kidneys. Sometimes, in despair of being able to fix on any particular organ, he concludes they must be all in fault—that, in fact, he has a complication of the gravest disorders. Yet he has been assured by various eminent physicians and surgeons that all his organs are sound. He reiterates his mournful tale and puzzles sorely by asking questions in rapid succession. "How do you account for this?" and "How do you account for that?" follow every fresh statement. Still there is an air of mystery about the patient; he has evidently something else to say, regarding which he feels diffident. At length it comes out that, caught by a specious advertisement, he was induced to read a publication of a class too well known to need description. From that time his wretchedness has been increased tenfold. With bitter remorse he has since attributed all his ills to habits of indiscretion, not merely long abandoned, but that had been almost blotted from memory. He has become a perfect self-tormentor.

It requires patience to listen to the entire

story, while he repeats an account of his sensations and details his unhappy thoughts. He states that, before seeing the publication in question, he was ignorant of the cause of his ailments, which is now too plain to him. In accordance, as he supposes, with his late views, he dwells, as a matter of especial importance, on a sensation of heat and unpleasantness in the urethra. It seems as if something existed there which ought to come away; yet he passes over other symptoms until questioned. We find that he has occasional uneasiness of the stomach—that his tongue is foul and his mouth clammy in the morning. At times he scarcely eats anything; at other times he eats heartily, but with little appetite. He is much troubled with constipation of the bowels; the fæces are generally very dark, and have an unnaturally offensive smell.

Sometimes, in a case like the present, the patient persists in the notion that he does not suffer from indigestion. Such an explanation of his troubles seems to him too simple. Indiscretions in diet are, therefore, not corrected, and other means of cure are neglected.

CHAPTER V.

HABITUAL DYSPEPSIA (*continued*).

NEITHER the list of symptoms nor the varieties of dyspepsia have been exhausted in the preceding pages; and some of those which are either of less frequent occurrence, or come less within my present scope, shall be next described.

That is a grave form of dyspepsia in which vomiting is a leading feature, and in which the vomited fluids contain the peculiar vegetable organisms, Sarcinæ ventriculi. Cases in which they occur are frequently complicated with organic disease of the stomach. Sarcinæ have been supposed to be always associated with enlargement of the stomach; but in one case which ended fatally I found the stomach to be unusually small.* Nothing peculiar has been determined in the fermentation which accom-

* "Medical Times and Gazette," Nov. 14, 1854.

panies sarcinæ; nor does fermentation appear essential to their development. The common yeast plant, Torlula cerevesiæ, is sometimes found along with them. The vomiting in cases in which sarcinæ exist is generally remarkable; it occurs in gushes almost without a strain or effort. The vomited matters are of a dark brown colour, and are often ejected in a state of active fermentation, which continues for a considerable time in the vessel into which they are received. These circumstances are generally sufficient to indicate the existence of the vegetable parasite before it has been proved by the microscope.

We meet occasionally with the following singular kind of dyspepsia:—

Dry food produces little or no uneasiness, but taking even a moderate quantity of fluid is followed by distressing results. There is a feeling of fulness or oppression in the stomach, sometimes accompanied by pain; gas is evolved, and the mouth becomes hot and dry. A splashing sensation is felt in the stomach long after drinking on any quick movement, and especially when lying down. If an observer

places one hand over the cardiac extremity of the patient's stomach, while a few quick strokes are given with the fingers of the other hand on the corresponding part of the body on the right, the splashing will also be felt. It is needless to remark that the same effect would be experienced in the healthy stomach, immediately after drinking freely; but fluids are then rapidly absorbed. This intolerance of liquids too often indicates serious disease. Some time since I was consulted by a gentleman in whom it was very marked; he expressed surprise that liquids distressed him much more than solid food, and that a simple glass of water produced "wind" and other unpleasant symptoms. He died of organic disease of the stomach. We may frequently observe modifications of this kind of dyspepsia. Patients say that slop and soup diet does not agree with them nearly so well as a mutton chop or some equivalent solid. Liquid diet has been too indiscriminately recommended for dyspeptics by some authors.

There is an affection of the empty stomach, the subjects of which are usually persons

exhausted by excessive mental exertion, or depressed by severe affliction. Agonizing pain, much resembling cramp, suddenly comes on; and marked tenderness at the pit of the stomach, coldness of surface, failure of pulse, and other indications of general collapse, accompany it. During the intervals between the attacks (which are of very uncertain length), the appetite and digestion are in some cases unaffected.*

Delicate people often complain of a "sinking sensation" in the stomach when empty, accompanied by a feeling of general exhaustion. If, as usually happens, these symptoms come on during the night, complete sleeplessness ensues, and the feet become unnaturally cold. Much distressing wakefulness is due to this unsuspected cause; the sensation referred to has no resemblance to hunger, and yet a biscuit and glass of sherry or a draught of porter will often cause sleep more promptly and beneficially than an opiate.

* See a paper by the Author, on "The successful use of Arsenic in certain kinds of Gastric Pain," *British Medical Journal*, Nov. 23, 1867.

Another stomach sensation is experienced on the day succeeding an unaccustomed indulgence in wine or other stimulants, especially if various kinds have been taken: some describe it as a feeling of "rawness," others of heat; and soda water, or some other cooling draught, is eagerly swallowed. There is no appetite for food, and if it be taken in the usual quantity, gastric oppression is felt. In these cases the gastric surface suffers direct injury, as Dr. Beaumont's account of the appearance of Alexis St. Martin's stomach under such circumstances has clearly proved. This sensibility to injury becomes lessened by repetition, and sometimes a false sense of security results. Habitual indulgence in intoxicating drinks leads, sooner or later, to the worst results, as shown by a flabby and tremulous condition of the tongue, irregularity of the bowels, complete want of appetite, and great irritability of the stomach.

Our knowledge of intestinal digestion is as yet limited; and intestinal dyspepsia is consequently less understood than that which has its seat in the stomach. The bowels are characterised by much greater sensibility than

the stomach; this is exactly what might be expected, since the stomach is a receptacle for crude substances, while the bowels are intended to receive them only after their conversion into a bland fluid. The passage of food imperfectly reduced by the stomach, over the intestinal muoous surface, causes pain and other distress, and (not uncommonly) convulsions in children. The connection between the nerves of sensation and motion and the net-work of the sympathetic system of nerves surrounding the bowels explains this. As, however, intestinal dyspepsia may be due to a defect in the digestive fluids proper to the small intestine, it must be considered independently of gastric dyspepsia. Some forms of stomach dyspepsia are more frequently associated with that of the intestines than others: in that which I have described as foul dyspepsia there is often much intestinal trouble. Imperfectly-digested semi-putrescent food frets the sensitive surface of the bowels, and a salutary diarrhœa is excited, by which the offending matters are got rid of, just as happens in caso of the stomach by vomiting. In that form of dyspepsia in which mental

symptoms preponderate, the bowels are usually at fault; obstinate constipation is a common symptom, and also a very dark colour and an unnatural odour of the fæces.

The symptoms of intestinal dyspepsia are not always distinct. One great source of confusion arises from its frequent complication with the stomach affection. The lower position in the abdomen to which the suffering is referred, is an indication not to be neglected. We have generally another clue in the time at which the symptoms come on; the intestinal distress begins when that of the stomach has subsided; that is, when the chyme is transmitted from the stomach into the intestines.

Disorders of the duodenum are occasionally capable of distinct recognition. The track of this part of the small intestine, beneath the cartilages of the right ribs, is sometimes the seat of tenderness and pain. Many dyspeptics experience acute pain and rigors at the time when the contents of the stomach are passing into the duodenum. The sympathies of this bowel are also remarkable; a common result of fatal burns is ulceration of its mucous surface.

The so-called bilious headache, "blacks before the eyes," nausea, and, in short, the combination of symptoms known as biliousness, appear to be referable as much to the duodenum as to the stomach.

Acute pain is more characteristic of intestinal than of gastric dyspepsia; faintness, cold perspiration, and shiverings are also more commonly present. The rumbling and twisting sensation in the region of the navel, described by patients, distinctly belongs to the small intestines. The last symptoms are sometimes accompanied by great but transient tenderness, which is generally relieved by pressure or by friction, and the absence of inflammation is also thus determined.

A burning sensation at the anus when fæces are being passed—sometimes compared to the effect of melted lead, or scalding water—is a frequent result of intestinal dyspepsia. It is a favourable symptom, since it shows that certain acrid secretions are being expelled, and is usually followed by relief of pain and flatulence. One of the clearest examples of dyspepsia attributable to both stomach and bowels,

is that accompanied by the kind of diarrhœa in which food is passed almost unchanged from the bowels. The cause of this is an unnatural irritability of the alimentary tube, which causes the food to traverse it too quickly for the action of the solvent fluids.

CHAPTER VI.

THE TREATMENT OF DYSPEPSIA BY DIET.

In the treatment of every variety of dyspepsia proper diet is, above all things, necessary; but certain indispensable rules and particulars must be concisely laid down. I promise not to afflict my readers with the story of the famous Cornaro,* nor to occupy time in useless details.

Attention to diet is so essential that we must be despotic on the subject, as half measures rarely succeed. It is obvious that great judgment and due consideration are required in

* The noble Venetian's life and experience may be profitably read; but they have been quoted by writers on dyspepsia *usque ad nauseam.*

each individual case; and even when these have been fully exercised, the grand difficulty remains of having our advice strictly carried out. It is easier to have any amount of medicine swallowed, no matter how nauseous, than to insure perseverance in a course of diet. Not only are good preliminary reasons necessary, but the patient becomes discontented if the desired results do not immediately follow. But while full co-operation with the medical adviser is necessary, something must be left to the discretion of the patient, since even in health no general rules apply; for, as already said, the requisite quantity of food varies with the period of life, constitution, and habits of the individual, as well as with other conditions. In quantity is also involved quality, as a much smaller amount of one kind of food will satisfy the appetite than of another.

The plan of this work allows no scope for considering the nature of food in general; but the kind of food to be selected by the invalid, as well as the time of taking and the mode of preparing it, claim special attention.

Breakfast.—After the long interval which

has elasped since the last meal, even the dyspeptic stomach is usually empty in the morning. Nevertheless, keen appetite is seldom felt, and too often nothing substantial is taken until dinner. This is an evil which much needs correction.

The waste of the fluids of the body during the night makes drinking at breakfast a necessity, but too large a proportion of tea or other beverage spoils the appetite for substantial food and interferes with its digestion. One large cup, or a cup and a half of fluid will be sufficient. Good black tea, not too strong, agrees well with most people, but a few find coffee preferable. Chocolate is not to be recommended, but cocoa, properly prepared, suits some stomachs. Barley-water or thin gruel may be substituted with great advantage, in cases where it is desirable to give a more nutritious drink, and when the nervous system is unusually excitable. These liquids are apt to disagree, however, in cases in which acidity prevails.

The bread used by the dyspeptic should be of the purest kind, and should never be eaten new. Bread containing bran is wholesome,

and is sometimes very useful in regulating the bowels, but is not suitable in cases in which the mucous membrane of the stomach is irritable as indicated by pain and tenderness. Dry toast is best adapted for these cases, and also for those characterised by acidity.

The practice of eating hot buttered toast, muffin, or other greasy preparation, cannot be too highly censured. The oily part separates in the stomach, and floating about, gives rise to heartburn and other mischief. Butter should always be used cold, and rather sparingly, while in some cases it must be interdicted. The yolk of egg, when not too much done, agrees with most stomachs; the white is less digestible.

In this country certain articles of food have come to be especially used at breakfast. Toasted bacon, fish prepared by different modes of drying, marmalade, &c., belong to the morning meal. In health these articles are unobjectionable, but the dyspeptic stomach will rarely be found capable of digesting them. Even toasted bacon, which is sometimes regarded as a "cure for indigestion," if fat, is

too oily, and, if lean, too hard of digestion to sit easily on the stomach.

When a sense of fulness, and other uneasy sensations already described, are only experienced after dinner,* less food should be taken at that meal, and the deficiency should be made up at breakfast. The principle to be kept in view is this, to apportion the amount of food necessary to sustain the body, more evenly over the waking hours than is commonly done. A great fault in the dietetic system of this country consists in the fact that most people are supported mainly by dinner. The meal is consequently too large, and from this unsuspected cause much dyspeptic suffering results. If man were strictly a carnivorous animal, he might satisfy the cravings of hunger, and maintain his health by a single daily meal. If man were strictly an herbivorous animal, he would be impelled to eat more constantly than his present constitution ever disposes him to do. Analogy and reason teach us that he blends the nature of both classes, and therefore the intervals between taking food

* See page 23.

should be neither so long as in the one case, nor so short as in the other. The dyspeptic patient should take something substantial and nourishing for breakfast. Nothing answers the purpose better than a mutton chop carefully broiled—not fried—and eaten hot. It will, of course, be proper to vary this, or the patient would tire of its sameness. Cold roast beef and mutton agree well with a few, but most persons find them heavy. Any of the digestible meats, as game or poultry, and occasionally fresh fish, may be tried, only let the patient bear the principle in mind of making breakfast nearly as substantial as dinner. The effect will be that a moderate dinner will be required, and that the stress upon the stomach will be diminished with accompanying good results.

No dietetic rule is of more importance than this, yet, simple as it appears, it is not one easy to enforce. Patients persist in saying, "I can never eat breakfast." The fact is, the habit of eating largely at dinner has so grown upon them that they are virtually supported by that single meal, and have no appetite for substan-

tial food at other times. Let the quantity taken at dinner be resolutely diminished, and breakfast will soon be appreciated. Most dyspeptics digest with greater ease animal food taken at breakfast than at dinner. I have often found this notably the case with reference to the same quantities at both meals. Not only is digestion better performed soon after the repose of the night, than when the nervous energies are more or less exhausted, but, owing to the early replenishment of the blood, gastric juice of better quality will be provided for the digestion of dinner.

The time for breakfast must vary with the individual case. On rising from bed, appetite is often completely wanting, yet the feeble stomach should not be allowed to remain long without refreshment. It will be sometimes proper, especially should the patient rise early, to take only a small cup of tea or coffee, with a biscuit and a little dry toast, immediately on getting up. If circumstances admit of it, gentle exercise out of doors may then be taken, and, after an hour or two, the solid breakfast as already recommended.

Luncheon.—Should the invalid adopt the plan just described of having slight refreshment on rising, and a substantial meal afterwards, luncheon will seldom be required, unless he dines very late. In any case, luncheon should always be of the lightest nature—something to stay, but not to satisfy the appetite—a rusk or biscuit; and should debility be felt, a glass of sherry or malt drink may be added. The natural action of the human stomach is intermittent, and the organ, when properly charged with aliment, should be allowed to dispose of its contents before any addition is made to them. The usual interval between our meals, which might appear arbitrary, is founded on physiological principles. In health the period of gastric digestion varies with the constitution of the individual, as well as the amount of exercise and the nature of food; but from four to six hours may be taken as its average duration.

Dinner.—The time for this meal must be regulated by circumstances. If a substantial breakfast is made at nine or ten o'clock, three or four in the afternoon would be the natural

time for dinner. But the effect of habit in this matter must not be set aside.

In this country, the time of the principal meal has a wide range, from one o'clock with the lower and a portion of the middle classes, to the fashionable hours of seven or eight. There is an obvious adaptation in this. Early dinners are adopted by those whose hours of rising from, and retiring to rest are early: late dinners are associated with late rising, and are suitable for those by whom, for purposes of pleasure or business, night is turned into day. In the latter case, the inconvenience of going to rest with a full stomach is not experienced. It is also to be remembered that while the time of digestion varies even in health, it is apt to be prolonged by disease, and no greater mistake could be made than that one meal should be heaped upon another in the stomach. Breakfast and dinner should always include the chief sustenance of the invalid. As a rule, plain cooking is best. Generally speaking, the dyspeptic should dine off one, or at most, two dishes, and roast or broiled meat is most suitable. In some cases good mealy

potatoes agree well, but in the greater number bread should be the staple. Vegetables of the finer kinds are not inadmissible, but in some instanees any sueculent vegetable induces flatulence. Cheese or pastry should not be eaten; but light farinaceous puddings seldom disagree, except in acid dyspepsia, when they are apt to increase aeidity. Simplicity of diet is especially neeessary for persons troubled with foul digestion—those who complain of repeated "bilious attacks."

There are other eases in which simplicity is undesirable. Here habit again steps in, and is not to be disregarded. Persons long accustomed to live luxuriously can ill bear the ehange to plain diet. Sometimes delieate and varied dishes are better suited to a stomaeh unused to plain viands. A small quantity of soup excites the digestive powers, this followed by a little fish, some light meat, all cooked *secundum artem*, form a dinner more easily digested than the same amount of simple roast beef or mutton. But it is never to be forgotten that the quantity of food taken is quite as essential a eonsideration as its kind or quality.

It has been much debated whether drinking at meals promotes or retards digestion. Dry meals have even been recommended to dyspeptics. But experience proves that a moderate quantity of fluid is salutary. Indeed, the very dilution of the gastric juice that has been so much dreaded by some authorities is now believed to aid digestion. The beverage taken at dinner must, however, be regulated by several circumstances. Practice and theory alike teach us that to distend the stomach with fluid immediately before a meal is highly unfavourable to its action on the food. As before observed, a moderate quantity of fluid taken during a meal is rather beneficial than otherwise, and that quantity must, in a great degree, be regulated by the kind of food eaten. Animal food requires more than vegetable; roasted or baked, more than boiled meat. Made dishes, on account of the spices and other condiments which they contain, cause thirst. The exact quantity of fluid is more difficult to fix than the quantity of food. The dyspeptic must, to a great extent, use his own discretion in the matter; but, as a rule, a

glassful of liquid at dinner should not be exceeded.

Tea.—In dyspepsia with mental disturbance, nervous depression, or wakefulness, tea is inadmissible. But in ordinary cases of slow digestion benefit is often experienced from it, if taken at the proper time and within proper bounds. Three hours after dinner, when the food in the stomach has been almost all converted into chyme, is the proper time for tea; one or two cups, neither very warm nor sweet, may be taken. When acidity prevails, much advantage will be gained by taking tea without sugar. Food at this time is not necessary, but a little dry toast or bread and butter are admissible. Let the dyspeptic, as he values his peace, eschew all hot buttered dainties, however attractive. If coffee be substituted for tea, it should be carefully prepared without boiling, but from the quantity of milk usually taken with it, coffee often causes acidity of the stomach.

Supper.—The remarks made about luncheon apply equally to supper. It should only be indulged in, if the actual want is felt. When

dinner is late, and especially if anything solid has been taken with tea, this can rarely be the case. As for the hearty, convivial meal, it must be abjured by the dyspeptic. When, however, a sense of exhaustion is felt at bed-time, some refreshment is desirable, as it not only strengthens the stomach, but conduces to sleep. An egg, a cup of arrowroot or sago, a biscuit and a glass of wine and water, may be appropriate. To be salutary at this time, food must be small in quantity, and the need of it must be distinctly felt. If swallowed without the instinctive want, a restless night or severe headache next morning will be the penalty. A strong reason why supper should be placed under these restrictions is its tendency to interfere with the appetite for breakfast, on the necessity for which so much stress has been laid.

Two dietetic rules should never be lost sight of by the dyspeptic.

1st.—He should always depend on his judgment, rather than on his appetite; and leave off eating when experience tells him that more food would be the cause of trouble to him.

2nd.—When a special disinclination for food is felt, the usual amount should not be forced down.

We are always accustomed in hospital practice to feed our patients by weight and measure, greatly to their own advantage: in private practice, on the other hand, the management of chronic diseases is sadly interfered with by the indiscretion or indifference of patients in the matter of diet. In dyspepsia, above all other diseases, this difficulty meets us. When dyspeptic patients are told to be moderate in eating, a common reply is, "I eat very little indeed;" against this, a rejoinder is difficult. In such a case, "little" represents an uncertain quantity, and the patient may in reality be swallowing far more food than is good for him. A sense of debility often leads the patient to eat more than he can digest, thus aggravating the evil. Sometimes, however, patients themselves inquire how much food should be taken during the day. These considerations induce me to present the reader with a scale of diet for the dyspeptic. The quantity of food required in health is very variable, and it is,

of course, much more so in a state of disease. But in an ordinary case of simple slowness of digestion, the following table would generally be found appropriate, supposing a fair amount of exercise taken :—

Breakfast.

	oz.		oz.		pt.
Bread (stale)	4	Mutton chop, or other meat (cooked), free from fat and skin	3	Tea or other beverage.....	¾

Luncheon.

Bread (stale)	2			Liquid.....	½

Dinner.

Bread (stale)	3	Meat (cooked) free from fat and skin	4	Liquid.....	½
Potatoes and other vegetables.....	4				

Tea or Supper.

Bread (stale)	2			Tea or other beverage.....	½
	15		7		2

This is by no means a strict dietary, but is adapted for that large class of dyspeptics who habitually eat too largely, and if adopted will be a powerful aid towards successful treatment.*

* It may be worth stating that the aggregate of a year's consumption of solid food at the above daily rate would be within a fraction of four and a-half hundredweights, considerably more than a third of this consisting of flesh. Since the above table was published, I have met the following:—Drs. Christison and Maclagan, in their researches

In the severer forms of dyspepsia, however, as when pain is experieneed, a greater diminution of the total amount of food is indispensable. Our praetiee must, of course, be regulated by the severity of the case; it will frequently be proper to advise the patient to diminish the quantity of his food to one-half, or even less. But the nieest diserimination is necessary: the point to be ascertained is how mueh food can be digested with comparative freedom from pain, yet to stop short of sueh privation as would induee debility. It should be always borne in mind that *too great* a diminution of food must, by impairing the blood, lead indireetly to inereased dyspeptic mischief.

We must be mainly guided by the sensations of the invalid, on whom should be impressed the neeessity of avoiding an amount of food previously found to cause suffering. It is true that in bad eases the most moderate quantity

on the diet of prisoners, found that for the average elass of persons using moderate exercise, seventeen ounces of solid food is required daily, and that four ounees of this should be nitrogenous. "This will suffiee to maintain health, strength, and weight." Compared with this prison fare for healthy people, the present dietary intended for weak stomaehs is on a liberal seale.

causes distress; in other cases, however, the patient is literally a self-tormentor. Sometimes nothing more is necessary to effect a cure than the correction of an alimentary vice—*sublatâ causâ tollitur effectus.* When the digestive organs are defective, it is absolutely necessary to diminish the quantity of food to meet their limited powers. We live by what we digest, not by what we merely eat. An overplus of food is poison to the enfeebled stomach, because it prevents the digestion of even a moderate quantity.

When we have reason to suppose the small intestine to be the seat of dyspepsia, caution in diet is equally necessary. The stomach may remain unaffected, and the appetite be unimpaired, and yet the intestines be unfitted to receive the chyme transmitted to them.

Insufficient mastication has been stated to be a common cause of dyspepsia, and mastication must be dwelt upon here as a means of treatment. Let it be impressed on the patient that the more thoroughly the morsels are chewed, the more easily will they be digested. Before swallowing them, animal fibres should be well

broken up by the action of the teeth. If the condition of the teeth does not allow of this, the meat should be served pounded or very finely chopped. In the case of bread, and farinaceous food in general, impregnation with saliva is still more essential.

The perfection with which false teeth can now be adapted makes them most useful substitutes for the natural organs, and if requisite, the dyspeptic should not neglect to avail himself of the dentist's art. Let it be remembered, however, that in no instance is economy more futile: badly-fitted teeth only increase the evil they were destined to remedy, and the base metal sometimes employed for their support has been known to affect the health most injuriously.

Regularity in the hours of meals cannot be too strongly insisted on. The stomach should not be disappointed when it expects to be replenished. If disappointed, either from the action of its own secretions, or from a want of sustainment in its muscular action, even a diminished amount of food will be taken without appetite, and will be sure to cause bad

symptoms. Any changes in the time of meals should be gradually made. In the case of the confirmed invalid, whose meals are all of a light nature, two o'clock in the afternoon is the best hour for dinner, supposing him to have breakfasted at nine in the morning.

The diet generally suitable to the dyspeptic is that which combines most nutriment with least bulk. In health, and especially if much exercise be taken, a certain bulkiness of food is necessary; but when digestion is weak, our object should be to nourish the body without oppressing the digestive organs, and then concentrated nutriment answers best.

Some of the results of Dr. Beaumont's well-known experiments as to the digestion of different kinds of food on Alexis St. Martin are here appended: they possess great interest in themselves, and may be usefully compared with the results of individual experience.

TABLE SHOWING THE MEAN TIME OF DIGESTION OF THE DIFFERENT ARTICLES OF DIET.

Articles of Diet.	Mode of Preparation.	Time required for digestion.	
		h.	m.
Rice	Boiled	1	0
Sago	Ditto	1	45
Tapioca	Ditto	2	0
Barley	Ditto	2	0
Milk	Ditto	2	0
Ditto	Raw	2	15
Gelatine	Boiled	2	30
Pigs' feet, soused	Ditto	1	0
Tripe ,, ...	Ditto	1	0
Brains	Ditto	1	45
Venison steak	Broiled	1	35
Turkey, domestic	Roasted	2	30
Ditto	Boiled	2	25
Turkey, wild	Roasted	2	18
Goose	Ditto	2	30
Pig, sucking	Ditto	2	30
Liver, beef, fresh	Broiled	2	0
Lamb, fresh	Ditto	2	30
Chicken, full grown	Frieassee	2	45
Eggs, fresh	Hard boiled	3	30
Ditto ,, ...	Soft ditto	3	0
Ditto ,, ...	Fried	3	30
Ditto ,, ...	Roasted	2	15
Ditto ,, ...	Raw	2	0
Ditto, whipped	Ditto	1	30
Custard	Baked	2	45
Codfish, cured, dry	Boiled	2	0
Trout, salmon, fresh... ...	Ditto	1	30
Ditto ,, ,, ...	Fried	1	30
Flounder, fresh	Ditto	3	30
Salmon, salted	Boiled	4	0

Articles of Diet.	Mode of Preparation.	Time required for digestion.	
		h.	m.
Oysters, fresh...	Raw	2	55
Ditto ,, ...	Roasted	3	15
Ditto ,, ...	Stewed	3	30
Beef, fresh, lean	Roasted	3	0
Ditto, dry	Ditto	3	30
Ditto, steak	Broiled	3	0
Ditto, with salt only ...	Boiled	2	45
Ditto, with mustard, &c. ...	Ditto	3	30
Ditto, fresh, lean	Fried	4	0
Ditto, old, hard, salted ...	Boiled	4	15
Pork, steak	Broiled	3	15
Ditto, fat and lean	Roasted	5	15
Ditto, recently salted ...	Boiled	4	30
Ditto ,, ...	Fried	4	15
Ditto ,, ...	Broiled	3	15
Ditto ,, ...	Raw	3	0
Ditto ,, ...	Stewed	3	0
Mutton, fresh...	Roasted	3	15
Ditto ,, ...	Broiled	3	0
Ditto ,, ...	Boiled	3	0
Veal, fresh	Broiled	4	0
Ditto ,, ...	Fried	4	30
Fowls, domestic	Boiled	4	0
Ditto ,, ...	Roasted	4	0
Ducks ,, ...	Ditto	4	0
Ditto, wild	Ditto	4	30
Suet, beef, fresh	Boiled	5	3
Suet, mutton	Ditto	4	30
Butter	Melted	3	30
Cheese, old, strong	Raw	3	30
Soup, beef, vegetables, bread	Boiled	4	0
Ditto, marrow-bones . .	Ditto	4	15
Ditto, beans	Ditto	3	0
Ditto, barley	Ditto	1	30
Ditto, mutton	Ditto	3	30
Chicken soup...	Ditto	3	0
Oyster soup	Ditto	3	30

Articles of Diet.	Mode of Preparation.	Time required for digestion.	
		h.	m.
Hash, meat and vegetables ...	Warmed	2	30
Sausage, fresh...	Broiled	3	20
Heart, animal	Fried	4	0
Beans, pod	Boiled	2	30
Bread, wheaten, fresh... ...	Baked	3	30
Ditto, corn	Ditto	3	15
Cake	Ditto	3	0
Ditto, sponge	Ditto	2	30
Dumpling, apple	Boiled	3	0
Apples, sour and hard ..	Raw	2	50
Ditto ,, mellow .	Ditto	2	0
Ditto, sweet	Ditto	1	30
Parsnips	Boiled	2	30
Carrot, orange...	Ditto	3	15
Beet	Ditto	3	45
Turnips, flat	Ditto	3	30
Potatoes	Ditto	3	30
Ditto	Roasted	2	30
Ditto	Baked	2	30
Cabbage head	Raw	2	30
Ditto, with vinegar	Ditto	2	0
Ditto	Boiled	4	30

This table is only approximately true, since the same kind of food is digested with different degrees of facility, by different individuals; and no account has been taken of various circumstances which influence the digestion of the same articles at different times.

If a chemical action were alone concerned in

digestion, we might tabulate the digestibility of different kinds of food in a very exaet manner from experiments. But although we ean dissolve albuminous eompounds by artifieial means, this kind of digestion is imperfeet. Complete digestion must be regarded as the result of ehemistry *plus* life. There even seems to be a speeial affinity between the individual living body and the artieles destined to repair it; why, otherwise, should mutton, in general the most digestible meat, prove the least so in a few eases,—or, on the other hand, should pork, a most indigestible artiele, prove in some instanees the reverse?

Most of the eommon alimentary substanees appended are arranged in three groups. The first eontains the artieles most suitable for the dyspeptie, the seeond those only admissible in less severe eases, and the third may be eonsidered a dietetic *Index Expurgatorius*, sinee few of the artieles eomprised in it should ever be taken by the invalid, while those to whieh an asterisk is attached should be regarded by him more in the light of poison than of food.

First Group.—Articles easy of Digestion.

Mutton, venison, sweetbread, chicken, rabbit, partridge, pheasant, grouse, beef-tea, mutton, broth, milk.

Whiting, smelt, turbot, sole.

Stale bread, biscuit, rice, tapioca, sago, arrowroot.

Asparagus, seakale, French beans, cauliflower.

Baked apples, oranges, grapes, strawberries.

Toast-water, black tea, Bordeaux and Rhine wines, dry sherry.

Second Group.—Articles moderately easy of Digestion.

Beef, lamb, hare, pigeon, turkey, guinea and pea fowl, duck, wild water-fowl, blackcock, woodcock, snipe; soups in general, eggs not hard boiled, butter.

Cod, haddock, flounder, pike, trout, raw oysters.

Potatoes, turnips, cabbage, spinach, artichoke; salads, especially of lettuce; apples,

peaches, apricots, pineapple, gooseberries, currants, raspberries, mulberries; bread and other farinaceous puddings; jelly, marmalade, rhubarb, and cooked fruits in general.

Cocoa, coffee, malt drinks, Madeira and Burgundy.

Third Group.—Articles difficult of Digestion.

*Pork, *veal, *goose; the liver, heart, kidney, and brains of animals; salt meat, sausage, *hashed or *stewed meats.

*Mackerel, *eel, salmon, herring, sprat, skate, sturgeon, salted fish in general, lobster, crab, prawns, shrimps, cray fish, *mussels, cockles, scallops, and cooked oysters.

Salad oil, melted butter, hard-boiled eggs, cheese; new bread, *muffins, and buttered toast; *pastry in general, *suet puddings, pancake, custards.

*Nuts of all kinds, pears, plums, cherries, dried fruits; *raw cucumber, beetroot, Jerusalem artichoke, onion, carrot, parsnip, peas, beans, mushrooms, pickles.

Chocolate, champagne, port, liqueurs.

Certain generalities connected with diet may be appropriately introduced here :—

Hot meat is more digestible than eold.

The flesh of young animals is less easily digested than that of full-grown animals.

The flesh of wild animals is more digestible than that of domestic animals.

The flesh of animals killed by hunting is more digestible than of such as have been shot.

Land birds are more digestible than water-fowl.

Of game, the long-billed birds are less digestible than other kinds.

The white parts of the flesh of eertain birds are more digestible than the dark.

The viseeral parts of animals, as liver, heart, kidneys, are indigestible; but the sweetbread is an exeeption.

White-fleshed fish are more digestible than the red-fleshed.

Fish containing mueh oil, as the eel, maek-erel, &c., are diffieult of digestion; and so are shell-fish in general.

Fat is in general obnoxious to the dyspeptic,

but while the lean of meat is rendered less digestible by salting, the reverse is true of the fat: hence the fat of bacon broiled is not only easy of digestion, but has obtained a reputation in the treatment of dyspepsia.

Olive and other vegetable oils are difficult of digestion; but this is not the case with cod-liver oil, and perhaps other animal oils. Oily fish is injurious, on account of the empyreuma and other changes effected in the oil by cooking. For the same reasons, butter or lard used in frying is often objectionable; uncooked is more digestible than melted butter.

Man has been appropriately defined as a "cooking animal," and it is certain that his digestion greatly depends on culinary art. A good cook is, therefore, invaluable to the dyspeptic. Before cooking meat, sufficient time should always elapse, as its tenderness is thereby greatly increased; but high meat or game should be scrupulously avoided. Of the ordinary modes of cooking, broiling is best, roasting next, while frying and baking are the worst. Meat cooked in the French style agrees much better with many stomachs than

the substantial underdone condition in which it is commonly served in this country.

Hashes, stews, and rich made-dishes are especially productive of foul dyspepsia. In this affection simplicity of diet should be especially studied. Vegetable is generally less easy of digestion than animal food; many vegetables, as peas, beans, cabbage, are very productive of gas, owing to their tendency to ferment—a circumstance taken advantage of by the Germans in the preparation of *sauer-kraut*. Although salads are seldom admissible in dyspepsia, raw vegetables are not so injurious as is generally supposed;—they are frequently blamed for what is really the effect of the oil used with them. The patient should carefully avoid swallowing the skin, core, and kernels of all fruit. I have known dyspepsia greatly aggravated by eating pears. This fruit in its ripest state contains an abundance of gritty material, which, as it cannot be separated in the mouth on being swallowed, irritates the digestive mucous membrane.

In dyspepsia with acidity, vegetables, fruit, and even farinaceous food, are especially likely

to disagree; and the two first should either be abstained from altogether, or very sparingly taken now and then in an experimental way. With farinaceous food the case is different. Bread in some form is an indispensable article of diet, and it is, therefore, important that it should be of the best quality, and adapted as much as possible to the invalid. Unfermented bread, which is now to be commonly had in London, certainly agrees better with some dyspeptics than the ordinary kind; but, on the contrary, others find it heavy and disagreeable. The bread taken by the invalid should always be two days old, and toasting diminishes its liability to become sour in the stomach.

In bad cases of acidity, great advantage will be gained by substituting simple flour biscuit for bread.

If there is one thing which disagrees more than any other with all dyspeptics, it is pastry —with which may be classed sweetmeats of all kinds.

Sugar should be used sparingly in all forms of dyspepsia, but in that attended with acidity

should be altogether abstained from. Sugar added to acid things conceals but does not destroy acidity. Many suppose that an acid tart loses its noxious qualities by being impregnated with sugar, but this is a great mistake. Those, also, who are anxious to reduce their fat should avoid sugar.

In painful dyspepsia, farinaceous substances are usually our main dependence. Preparations of arrowroot or sago, &c., may sometimes be taken without inconvenience, when the smallest portion of meat would be the cause of dire suffering.

Although there are remarkable exceptions, broths, and fluid nourishment in general, are adapted to a large proportion of severe cases. As milk contains all the materials of the body, it is one of the best forms of liquid diet; but unfortunately it frequently disagrees with the delicate stomach. Milk when boiled sometimes agrees better than raw. Good black tea, not too strong, with little milk or sugar, is generally unobjectionable. Coffee is more apt to produce acidity, and the same observation may be made of cocoa. Chocolate as usually pre-

pared is inadmissible, on account of the quantity of vegetable oil which it contains.*

Except in painful digestion, spices and condiments used in moderation generally do no harm. Mustard and pepper are useful in slow digestion: hence Cayenne pepper has long been an ingredient in dinner pills. Vinegar aids the digestion of many substances, and some patients find it to be preventive of foul digestion. Salt is the natural relish, being indispensable to health.

In a large proportion of cases, water alone should be the habitual drink; its quality is therefore of great importance. Some persons are, in this respect, so susceptible, that they experience derangement of the digestive organs if circumstances oblige them to drink water to which they are unaccustomed. Various earthy salts, especially sulphate of lime, are common impurities of water.

There is considerable difference of opinion

* A patent preparation from cocoa, called cocoatina, of great purity, and free from oil, may be ordered at any chemist's or Italian warehouse. It makes an excellent beverage for the dyspeptic.

as to whether stimulants should be taken in dyspepsia, which seems to have arisen from not having sufficiently discriminated their varieties as well as the varieties of the disease itself. My own experience in this matter is as follows:—Bordeaux wine of good quality and medium natural strength—not brandied—such as may now be had at a moderate price, is the least objectionable stimulant in all forms of dyspepsia. In the majority of cases, a couple of glasses with dinner are a great help to appetite and digestion.* So far from being hurtful, as many suppose, its acidity has much to do with these results. Claret does not cause undue sourness of the contents of the stomach, and it is the best wine for persons who have gouty tendencies. There is, however, a slight astringency in red wines, which in exceptional cases disagrees with the stomach, and in these

* Dr. Druitt, in his admirable work on Wine, says:—"One thing that would go with the greater use of Bordeaux wine would be the custom of drinking it in its proper place *during dinner*, as a refreshing and appetizing draught, to entice the languid palate to demand an additional slice of mutton."—Report on Cheap Wines, p. 42. Renshaw, 1865.

instances the colourless German wines may be substituted.

In some cases of slow digestion, light sherries, as Amontillado and Manzanilla, agree better, as the contractions of the flabby stomach are promoted by them while fermentation in the contents of the stomach is checked.

In digestion with acidity, weak brandy-and-water is frequently appropriate; but in some cases it adds to the symptom in question.

In painful digestion, French or German wines should only be taken, as in many cases any stronger stimulant would severely aggravate the disease. For the neralgic affection which especially come on when the stomach is empty, brandy is useful as a temporary remedy.

In foul digestion, stimulants are as likely to do harm as good, and care should be taken not to take a mixture of different kinds.

In dyspepsia in which mental symptoms predominate, a fair allowance of generous wine is often but not always useful. The nervous energy and circulation of the patient are usually below par, and they, as well as the stomach, require stimulation. Good port suits

a few patients, but there are many to whom it is very injurious; and in some cases a glass taken after food completely disturbs digestion. Effervescing wines are, as a rule, very injurious. They give rise to fermentation, owing to the process not having been previously completed in the wine itself. The dyspeptic not infrequently experiences for some days an aggravation of symptoms, or else a sense of general depression from a single indulgence in champagne.

It may be remarked of spirits, that brandy has astringent properties, so that many people complain that it makes their skin hot and dry. Whisky has the contrary tendency, and sometimes causes perspiration; while gin is decidedly diuretic.

Malt drinks are inadmissible in a large proportion of cases, but as they combine nutritive with stimulating properties, when they agree with the stomach, are useful in sustaining the strength between breakfast and a late dinner. A glass of good ale or porter, with a biscuit, often acts as a substitute for substantial food, when the object is to avoid overloading the

stomach. Care should, however, be taken at other times that the satisfying qualities of malt drink are not allowed to take the place of solid food.*

* General experienee shows that the malt drinks best adapted to the delicate stomach are, of the lighter kinds, the bitter ales of Allsopp and Bass; and of the heavier, the so-ealled XX of Guinness.

CHAPTER VII.

THE HYGIENIC TREATMENT OF DYSPEPSIA.

In all dyspeptic cases much benefit is derived from attention to the state of the skin. The frequent use of the tepid bath, and of soap with a hard brush to free the choked-up pores, are very salutary.

When available, the Turkish bath, for the introduction of which this country is indebted to Mr. Urquhart, presents a means of cleansing the skin altogether superior to any other. No one who had not witnessed it, could imagine that so much *débris* could be removed from a skin apparently clean, as by the processes of the bath. The *débris* consists of the external layer of the skins or epithelial covering, which adheres unduly when perspiration is seldom induced and the surface is constantly covered. This relieves the pores so remarkably,

that perspiration is effected far more easily in those who are accustomed to the bath than in others. The cold douche or cold plunge, on account of their bracing effects, should always be taken after the bath.

No remedy is more valuable in the treatment of dyspepsia than the cold bath, yet it is difficult to explain its immediate action, except by a sympathy existing between the skin and the mucous membranes. Most people are familiar with the quick increase of appetite after a sea-bath; but even the dyspeptic patient, long a stranger to the sensation of hunger, will sometimes experience it after the cold bath, and digest without difficulty what at another time would have caused distress. It must never be forgotten, however, that the success of all bathing depends on the completeness of the subsequent reaction. If the patient feels cold and uncomfortable after bathing, harm, and not good, has been done; the matter, therefore, requires the medical attendant's close attention.

Sea-bathing is best adapted for those who are at least moderately robust, and can endure without chill a limited exposure to the open air.

The effect of the wind during transit into and out of the water is sometimes objectionable, and even the discomfort of dressing in a bathing-machine may be injurious, by delaying or altogether preventing salutary reaction. Another question is the time at which the sea-bath should be taken. A common impression prevails that all bathing is best before breakfast. Those who are sufficiently robust may bathe and subsequently enjoy breakfast, but for those less strong I am decidedly opposed to the plan. As a rule, the best time for the sea-bath of the dyspeptic is about noon, when the stomach is sufficiently empty, and the action of the sun has cleared away all sea-mists. The bath should never be of long duration, and exercise should be taken immediately after it, to encourage the glow of heat and the pleasureable sensations characteristic of complete reaction.

When the patient is very delicate, bathing in the house is preferable, and it has the advantage of being available in every locality and season. Immersion of the whole body, the shower and sponge baths, may be regarded as degrees suitable in different cases. Total

immersion in water at the temperature of the air, or lower in summer, ranks next to sea-bathing; next follows the shower bath, and for those too delicate for either, the sponge bath is the substitute. In using the shower bath it is often useful to protect the head from the shock; and it must be remembered that, in addition to the action of cold, there is in this mode of bathing a stimulating effect unsuited to some constitutions.

In all cases of bathing in the house, brisk rubbing with coarse towels should be practised for some minutes as a substitute for exercise. When the weather is damp or cold, this rubbing, as well as dressing, should be done in a well-warmed room.

To ensure good digestion, sufficient exercise is absolutely necessary; exercise improves the digestive secretions, by improving the general health. Moreover, the necessary movements of the alimentary tube greatly depend on exercise of the voluntary muscles. I have frequently proved by experiment, that if a person lie extended on his back, the heart's action will be quickened by the slight elevation of a single

limb. This shows the close connection between the voluntary and involuntary muscular systems, and how the contractile notions of the stomach and intestines are likely to be influenced by bodily movements.

Exercise is necessary for health, because it promotes renewal of the tissues—in other words, the processes of waste and of repair. Men who use great muscular exertion eat more than those who live at ease, and everyone is conscious of increase of appetite after a single day's exercise, if it has been preceded by a period of sedentary occupation. Out-door exercise is incomparably best, and the invalid should remain in the open air at least two hours daily. The weather must not be allowed to interfere too much with this rule. There is far more danger to be feared for the dyspeptic from sedentary habits than in a little increase of damp or cold, when properly encountered by appropriate clothing. A broad belt of flannel should be worn round the abdomen if the bowels are susceptible. The kind of exercise must be adapted to the character and intensity of the case, but should

stop short of fatigue. In severe cases passive exercise in a boat or open carriage is best; but for those who are stronger, walking at a sufficiently quick rate to produce a glow of heat is highly beneficial. Riding on horseback is the exercise most generally useful to the dyspeptic. There is much benefit in the rapid change of air,—in the abstraction of mind, owing to the unconscious attention bestowed on the horse, and the sense of easy, independent action which horse-exercise gives. But the benefit is largely due to the particular effect on the digestive viscera themselves. Their peristaltic movements are stimulated, and the abdominal muscles made to act on them in a continuous and peculiar manner. For these last reasons, digging is an exercise which those who are fond of gardening will find salutary, as well as agreeable.

Those who are sufficiently robust will be greatly benefited by athletic exercises, as rowing, cricketing, and field sports in general.

When the weather entirely forbids going out, there are many exercises which can be beneficially used in-doors. Walking up and

down a large room is sufficient for some; while fencing, sparring, dumb-bells, &c., may be resorted to by another class of invalids. Persons of sedentary habits should avoid stooping, and, in particular, any pressure against the stomach. In the occupations of the office, standing at a desk of sufficient height to prevent stooping should alternate with sitting.

Dyspeptics ought not to exercise before breakfast, or at least before taking some refreshment. Yet, as in the case of bathing, the contrary opinion is sometimes held. What has been termed the hardening system has its advantages, but if indiscriminately employed, proves very injurious. People of robust habit may increase appetite and digestion by morning exercise before breakfast; but, from the same cause, less vigorous persons generally lose their relish for it, and experience discomfort if they persist in swallowing the usual amount of food.

The best time for active exertion of either body or mind is the interval between breakfast and dinner; that is, when the digested food begins to be absorbed into the blood, and all the functions are stimulated and refreshed.

But let this preeept not be forgotten: mueh mental or bodily fatigue is the worst possible preparation for the principal meal. The man of letters should not sit down to dinner exhausted by his labours, nor should the man of business, who lives in the suburbs of a great eity, do so when over-tired by a long and hurried walk from his chambers or his eounting-house. After dinner, from one to two hours should always elapse before any real exertion of mind or of body is undertaken.

The dyspeptie should sleep on a hair mattress, and his eovering should only suffiee to ensure proper warmth. The period of sleep should be regulated by his requirements, but eight hours appears the natural amount for an adult. Lying late in bed in the morning, without sufficient cause, is enervating, and is to be guarded against, because indisposition to rise is a eonstant attendant on dyspepsia. The practiee of breakfasting in bed, unless absolutely required on account of debility, cannot be too strongly condemned.

The evil effects of an impure atmosphere have been dwelt upon: it is only neeessary

here to insist on the necessity of good ventilation, especially where gas is used. Bed-rooms, where so much of life is passed, should be large and lofty, and always have free communication with the outer air. What has been said of smoking and taking snuff in excess as causes of dyspepsia, shows that to ensure successful treatment, these habits must be moderated, if not abandoned. Let it be remembered that in these instances excess is altogether relative to the effects produced on the individual.

The beneficial effects of change of place are so well known, that little need be said to recommend it. Some subtle influence for good, quite independent of climate in its ordinary sense, is connected with it; but much is attributable to mental causes. The close relation between the stomach and the brain makes it necessary that in bad cases perfect rest be given to the brain, and, if possible, that the whole current of thought be changed. This can be effected best by change of place and outward association. There is something in travelling calculated to take a man out of himself, and to lessen his self-consciousness. Some men, it is true, carry

everywhere with them their own moral and social atmosphere—live in their own narrow circle of thought and feeling, are attended by all their cares, no matter what the climate or what the associations;* but such instances are, happily, rare.

For the reasons assigned, travelling is especially desirable for the hypochondriac.

In change of residence, climate should be a chief consideration. According to my experience, most cases of dyspepsia are benefited by a cool and bracing atmosphere. The uncomplicated disease is here spoken of; for where the lungs are concerned, we must in our selection generally give these organs precedence, and a moister and warmer atmosphere may be desirable. If gastritis is present, that must claim priority; the latter kind of climate will be suitable, and so in other cases. But there are many reasons why, for dyspepsia, cold is generally to be preferred to heat. Appetite is

* "Scandit æratas vitiosa naves
Cura: nec turma equitum relinquit:
Ocior cervis, et agente nimbos
Ocior Euro."

greatly influenced by temperature, cold being more conducive to it than heat; while exercise, so necessary for the dyspeptic, can be taken with greater ease in cold than in warm weather.

A large number of patients will derive benefit from a systematic disregard of every-day comforts, and extending their rambles beyond the reach of railways and luxurious accommodation. Let him who is not afraid of "roughing it," and finds, as he probably will do, that he is capable of the exertion, try the effects of seven or eight hours' daily exposure in the saddle to a bracing atmosphere. Let him who prefers it grasp the alpenstock, and avoiding extreme fatigue, brace his nerves as well as his muscles in climbing Alpine summits. In such cases difficulties on the score of food will rarely present themselves. Reduced to the coarse fare of the country, the stomach will not only accept with relish, but readily digest that which at home would be rejected with disgust. Good milk can be obtained almost everywhere, and should be the traveller's staple; and this, with biscuits and pre-

served provisions in case of need, will fulfil all the requirements even of the dyspeptic.

Sweden and Norway present accessible places of resort where picturesque scenery is combined with a cool summer climate, and where the gun and the fishing-rod can be employed with effect. Those who are not afraid of the sea-voyage should visit Iceland, now brought comparatively within reach by steam communication. There, Nature may be seen in her most rugged aspects, and those astonishing phenomena are presented which cannot fail to excite and to interest the most self-engrossed mind or the most desponding spirit. Let those whose object is economy and less preliminary trouble make such places as the Valley of Chamouni their head-quarters. Situated at the foot of Mont Blanc, Chamouni presents many advantages. So much is residence in an elevated region beginning to be appreciated, that men of the most philosophic minds have assured me that it alone suffices to restore their vigour when exhausted by mental application and sedentary life. They allege that the difference in health and spirits

effected by such a position and one of ordinary elevation is very marked. Probably lessened atmospheric pressure, and consequent electric and other changes, may afford the explanation. The Valley of Chamouni is 3,000 feet above the sea level, and from the formation of the mountains has the advantage of free ventilation. All that is rich in verdure and grand in glacier are constantly within view, and from this as his resting-place the traveller may undertake Alpine excursions suitable both to his strength and his purse. The means of reaching Chamouni have been much facilitated of late, and the accommodation improved. But there are spots in Switzerland still more accessible, and perhaps equally desirable, as centres from which excursions might be made.

The good effects of sea-bathing have been already spoken of, but even residence by the seaside is very salutary. It is a true instinct which causes so many thousands to rush to the coast from inland places and from crowded cities in autumn. Sea-air is in itself most invigorating, and perhaps the ceaseless changes and regular flow of the ocean, joined to the

many objects of interest for young and old, learned and unlearned, which the seaside affords, contribute much to its healthy influence. The inhabitant of a city is there less likely to be oppressed by the monotony of the country, so often complained of as counteracting the good effects of pure air and quiet.

Those moral consolations which are, in many cases, powerful aids to recovery, are next to be considered. But it has been already pointed out that great individual differences exist, and that with one class of patients moral interference is altogether unnecessary.

The task of consoling hypochondriacal sufferers is usually very difficult,* and always requires nice discrimination. The judicious physician may effect much by assuring the patient of the groundlessness of his fears, or of the over-severity with which he has judged himself, and his mind may be relieved of

* The difficulty of giving mental solace is finely expressed in the following passage :—

"Words are words. I never yet did hear
That the bruised heart was pierced through the ear."

Othello.

imaginary terrors or frightful antieipations. It is true, however, that mental relapses are frequent,—that what is believed one hour is questioned the next, and again altogether doubted. But even temporary remissions give tone, and a faeility of resuming a healthy train of thought is aequired by repeated efforts. In this way the adviee of the physieian is valuable. He should encourage his patient to speak freely, to unburthen his seeret grief, and then judgment and diseretion must be used in applying the remedy. To treat any statements, however startling or improbable, with levity is seldom judieious. Few, if any, ean be laughed out of their fancies, and a passing smile of ineredulity would, in many eases, lose for ever the eonfidenee of the patient. Without pitying, he must sympathise : to sensitive minds the pity of a stranger is generally repulsive ; and there are minds so eonstituted that it is intolerable even from their nearest friends. He must show that he really feels for his patient, but the demonstration must be one of manner rather than of words. In approaehing the subjeet of his morbid faneies,

we may often find it necessary to expose their fallacies; but we must do this delicately, and with the assurance that his delusions form part of his disease, and therefore deserve full consideration. Above all, we must not only avoid exaggeration, but what may seem to the patient in any way to resemble it. Nor must we good naturedly promise too much, nor too speedy results from treatment. It must be always remembered that the mind of the hypochondriac, though it may be weak and warped in certain directions, generally preserves its full force and clearness in others. The patient is more suspicious than when in health, but as capable of detecting imposition as ever. Confidence is only inspired by truth; and trust in the medical attendant, always essential, is here indispensable.

CHAPTER VIII.

THE USE AND ABUSE OF MEDICINES.

No diseases are more capable of receiving benefit from medicinal agents than disorders of the stomach. In most other diseases the stomach is merely a medium of transmission, while in the present instance our remedies come directly into contact with the affected part. The action of medicines on the stomach may, in this respect, be compared with the effects of external remedies on diseases of the skin, the difference being in favour of the more impressible gastric mucous membrane.

The patient should, however, be always instructed in what is really to be expected from medicines. He should be assured that their efficacy consists rather in rectifying morbid conditions, than in preventing their

recurrence. That recurrence can only be averted by attention to dietetic and hygienic rules, which no medicines can supersede.

As the plan of this work has special reference to dietetic and general treatment, no space is available for such a consideration of the various medicines that may be employed against dyspepsia as their importance demands. The abuse of some medicines leads to the worst consequences, and stress will be laid on such as are most frequently misapplied. Brief notices of other remedies must suffice.

We possess in alkalies a class of medicines which act in the body precisely as they do out of it. In the stomach, or elsewhere, a given quantity of acid is saturated by a proportionate quantity of alkali; from alkalies great advantages are therefore to be derived. But of all our remedies none are more transient in their effects; and we must regard antacids merely as palliatives.

Alkalies are particularly useful in dyspepsia with undue acidity, and a deposition of lithic acid, or lithates, in the urine. But in the other form of the same disorder mineral acids

succeed better.* By improving the condition of the stomach they act indirectly as antacids, and, if slower in effect, have the advantage of being far more permanent. Hydrochloric acid is also very useful in slow digestion, and I agree with Dr. Habershon that lactic acid, although much praised in this respect, is inferior.

The urine should be examined from time to time during a course of alkaline treatment, which should be suspended if phosphates make their appearance.

In the use of alkalies certain differences are observable. Soda is less disagreeable to the taste than potash, and is especially useful when the tongue is furred or coated. Soda seems to exercise a special action on the liver, by which the secretion of bile is increased. It is certain that soda has less action on the kidneys than potash. The carbonates of soda may be given in the form of lozenges as well as in solution.

As far as the stomach is concerned, potash is very similar in its effects to soda; but potash is superior when lithic deposits prevail in the urine. Bicarbonate of potash is to be preferred

* See p. 77.

to the solution of potash, or to that somewhat weaker preparation known as Brandish's alkaline solution. The caustic properties of potash are so energetic, that the delicate surface of the stomach is exposed to injury should it happen to be insufficiently protected by mucus, or unless enough acid is present to neutralize the alkali. This statement is not made from theory alone, as I have met cases in which the stomach was injured by liquor potassæ taken in large doses.

Magnesia is devoid of caustic or irritant qualities, and is almost tasteless. When in conjunction with acidity there is much irritability of stomach, it will therefore be found preferable to either soda or potash. Its laxative properties are also often advantageous, and its action on the urine is scarcely inferior to that of potash. Magnesia also possesses sedative properties; it is an efficient remedy in gastrodynia, and is often valuable in combination with bismuth or manganese, in cases of dyspepsia with epigastric tenderness. Inconvenience has occasionally arisen from the concretion in the large intestine of magnesia taken continuously in large doses. Dinneford's

solution of magnesia in water impregnated with carbonic acid is a valuable preparation. It is often an effectual remedy for headache and nausea arising from errors of diet, and it is also a useful laxative in the treatment of dyspepsia with foul eructations.

The doses of alkaline medicines should in each case be carefully regulated by observation of their effects in checking acidity. So much only should be taken as from the sensations of the patient seems sufficient. Any excess interferes with digestion by neutralizing the acid of the gastric juice. Here the remark holds good, that it is sometimes more difficult not to pass the goal than to reach it. The best time for taking alkalies is three or four hours after a meal, or when the partially digested food is about to pass into an unnaturally acid condition. In many cases repetition of the alkaline dose seems to increase the tendency to acidity. In others the temporary relief afforded is so much valued by the patient, that alkalies become an absolute want. The dose of soda, or potash, or magnesia is resorted to after every meal. This is particularly to be

guarded against. From the influence of habit, larger doses become necessary to produce a given effect. The health is slowly but surely impaired, and a condition of blood resembling that in scurvy sometimes results. In such a case, digestion, instead of being improved, is seriously injured. In a few instances alkalies act upon the system so powerfully, that a state of nervous excitement is produced even by a single dose.

Vegetable bitters are useful in most cases of dyspepsia in which the stomach partakes in a general debility of the system. They are well adapted for the phlegmatic, and for persons of languid circulation: not so much so for the plethoric, and those of the inflammatory tendency. These bitters are highly useful to the debilitated stomachs of those who indulge too freely in alcoholic stimulants. But considerable differences are traceable in the nature and adaptations of this class of medicines.

Strychnia acts not only as a bitter, but possesses other valuable properties in dyspepsia. It need hardly be urged that this energetic drug requires to be exhibited cautiously, but

its beneficial effects are often remarkable. Speaking from extensive experience, no medicine appears to me of more value in the present disease. Strychnia is particularly indicated in dyspepsia attended by nervous debility. In that numerous class of cases in which abnormal sensations in various parts of the body—as the throat, the head, or the limbs—are experienced, it will generally be found useful. It is the best tonic for the class in which mental symptoms predominate. But it also possesses excellent local effects, and acts by increasing the tone of the muscular coats of the stomach and intestines. When these coats are relaxed, gases are generated, mainly owing to retardation of the aliment in the cavities. No remedy has in my hands proved so permanently effectual as strychnia against this disorder. In the case of a gentleman who suffered most severely from sudden and almost daily accumulations of gas in the stomach and bowels, the attacks were attended by great mental oppression; often by fits of crying. The symptoms, in fact, resembled those of hysteria very closely. The case is put forward particularly on

account of its severity, and because the patient was cured by strychnia, and remained well as long as he was under observation.

Cod-liver oil acts beneficially by repairing the effects of imperfect nutrition, and thus improving the general condition of the body; and it can hardly have escaped the notice of any one who has prescribed the oil extensively, that certain symptoms of dyspepsia are often directly removed by it. Many cases of painful digestion, some even attended by water-brash, may be cured or greatly relieved by the oil; and, contrary to what might be supposed, it is an excellent remedy for heartburn.*

Occasionally, however, the oil is itself the cause of nausea, flavoured eructations, and epigastric pain. Olein, freshly prepared from the oil, should then be substituted. It seldom fails in obviating the inconveniences mentioned; and the active principles of the oil, as the iodine, bromine, &c., adhere to the olein in its separation from the margarin.†

* For an explanation of its action, see Appendix A.

† See my paper in *Medical Times and Gazette*, July 21st, 1855. Also Dr. Garrod on Cod-liver Oil, in *British and Foreign Medico-Chirurgical Review* for January, 1856.

Some preparations of iron are valuable remedies in slow digestion occurring in persons of nervous and lymphatic habits, and in dyspepsia dependent on anæmia. They improve the digestive secretions by improving the blood. The preparations most easily borne by the stomach, and least likely to constipate the bowels, are the ammonio-citrate, the ammonio-tartrate, and the lactate of iron.

Several substances possess the power of exciting the action of the stomach; and doubtless from this the almost universal use of pepper, mustard, and other stimulating condiments, with certain articles of food, has arisen. Some persons, indeed, tell us that Cayenne pepper is necessary to enable them to digest with ease almost any kind of food.

In cases of slow digestion, ipecacuanha is often very useful, if taken shortly before the principal meals. Dr. Budd supposes that it acts by increasing the secretion of gastric juice; but it appears to me more probable that it benefits by increasing the movements of the stomach. The dose of ipecacuanha must be regulated by experience: a quarter of a grain

will spoil the appetite and cause nausea in some persons, while one or two grains may be advantageously taken by others.

Rhubarb in small doses appears to have similar effects to ipecacuanha, but in an inferior degree. The root of rhubarb, like that of ginger, is not uncommonly carried in the pocket by dyspepties, and advantage is said to be derived from chewing fragments of it.

Various essential oils and aromatic tinctures are in popular use as stomach remedies. They are chiefly employed in flatulence, and cause expulsion of gas by the contractions which they induce. Brandy, sulphuric ether, and ammonia are used with the same intention and with equal benefit.

Substances such as charcoal, hyposulphite of lime, permanganate of potash and carbolic acid, which either interfere with putrefaction and fermentation and the development of vegetable parasites or absorb gases, are often very serviceable.

Wood charcoal is a remedy which has deservedly obtained much attention. In some parts of the country the scrapings of a burned stick

are a popular remedy for flatulence. Charcoal possesses the property of absorbing gases, while the value of the other remedies mentioned depends on their power of hindering their formation. Charcoal is also antiseptic, and is therefore very applicable in dyspepsia with foul eructations. The objections to its use lay hitherto in the following facts:—(1.) Very large doses were often required, and although otherwise innocuous, inconvenience not unfrequently arose from its accumulation in the body. (2.) The power of the remedy is in proportion to its freshness. If it has been long prepared or exposed to the air, or, as inevitably happened under the old plan of administration, is saturated with fluid previous to being swallowed, its beneficial action is greatly impaired. After many experiments, a method has been found by which these objections are removed, while the kind of charcoal best adapted for medicinal purposes has been determined.*

Certain salts of bismuth, silver, and zinc are well known to possess tonic and sedative actions on the stomach. They blunt over-

* See Appendix B.

sensibility of its mucous membrane, and thus render it more tolerant of contact with the food. Gastric pain and tenderness on pressure are symptoms which frequently prove very difficult to subdue. In the hope of finding a remedy more efficient than any of those mentioned, I was long engaged in trying the effect of several other substances in these affections, and can, after much experience of it, with great confidence recommend the purified oxide of manganese as a remedy in efficacy exceeding bismuth, which has hitherto been looked on as the best of its class. Manganese is free from the strong astringent action of bismuth on the bowels, which almost invariably produces constipation. For this reason, manganese may be given, when desired, in much larger doses than bismuth.*

The compounds of mercury have been much employed in digestive disorders. Although it has been much questioned whether this mineral exercises any effect on the secretion of bile, general experience proves its utility in some affections of the liver.

The "blue pill" and "black draught" sanc-

* See my paper, *Medical Circular*, Jan. 6, 1864.

tioned by the great name of Abernethy, are still in common use. The temporary good effects of this treatment are undeniable, but observation has convinced me of its ultimate injurious tendency. Some other remarks on this point will be made under the head of purgatives.

Purgatives, and the General Treatment of Constipation.

When the lavish use of purgatives by some practitioners is considered, it may seem hazardous to assert, that in treating dyspepsia, these medicines are seldom required. That form of depletion which consists in blood-letting has been almost laid aside: that form of depletion which consists in repeated purgings deserves a similar fate. In the constipation of dyspepsia, purgatives may be allowed to aid, but should not substitute, the natural calls for evacuation. They should be mild in action, and laid aside when possible, as undue stimulation of the bowels only increases the evil they were intended to rectify.

Although a single daily expulsion of fæces

is habitual with most individuals, there are many exceptions. The bowels may be regularly moved twice or oftener in the day, and a departure from this may induce a state of general discomfort. It is generally plethoric persons, in whom the blood-making function and the processes of waste and repair are very active, to which this occurs. In delicate persons, on the contrary, and in those of the bilious temperament, the bowels may be habitually unmoved for days together, while the health continues perfect; constipation is, therefore, a relative term.

We should not fail to ascertain the habit of the individual when in health, and to regulate our practice accordingly. It is often desirable to divest the patient's mind of the necessity for moving the bowels daily. Many worry themselves about this without reason, and from the same cause much of the injurious practice of constantly swallowing purgatives arises. When, however, constipation is distinctly a result of dyspepsia, great attention must be given to the bowels. On the other hand, in the treatment of some stomach affections, the means we

employ are directly productive of constipation ; thus the use of medicines containing tannic acid, and preparations of bismuth, opium, &c., requires us to take the bowels into special consideration.

It is a great drawback to the use of purgatives that their action increases the tendency to constipation. Castor oil is least liable to this objection, and when given daily, in gradually diminished doses, is often attended by the best results. But in most cases it is so obnoxious to the stomach as to be quite inadmissible. The oil should be warmed before taking it, by which its viscidity is much diminished. The addition of essential oil of almonds in the proportion of one drop to six ounces of castor oil has a remarkable effect in covering its nauseousness, and the sedative effect of the essential oil renders the stomach more tolerant of the dose.

As a rule, however, those purgatives should be chosen which, both as to bulk and quality, are least offensive to the stomach. The well-known compound colocynth pill is one of the best of the stronger kind, and aloes, from its

special action on the large intestine, is also valuable. The compound rhubarb pill is an excellent mild purgative. The neutral salts stimulate, and waste the intestinal secretions unduly, and increased constipation is the general result. When the stomach will bear it, sulphur is an excellent laxative; the stools which it produces have commonly the natural consistence, and it leaves no bad effects. Sulphur is also valuable for hæmorrhoidal affections associated with dyspepsia. It may often be advantageously combined with magnesia.

Tonics, either alone or combined with purgatives, sometimes succeed in regulating the bowels when other means fail. Compounds containing strychnia are especially useful. Half a grain of extract of nux vomica, half a grain of sulphate of iron, and four grains of the compound pill of colocynth, form a combination, which, taken early in the morning, generally induces gentle action of the bowels.

Hyoscyamus has the property of diminishing the griping tendencies of vegetable purgatives, and, in common with several plants of the same

order, is itself a laxative. Tobacco-smoking is resorted to by many to induce action of the bowels; and Bretonneau pointed out the especial use of belladonna in constipation. Caution must be used in prescribing this active drug, and the variable strength of the extract must be borne in mind; it will be well to commence with a quarter of a grain for a dose, twice a day, and gradually to increase to one grain. I can, from experience, report favourably of this remedy.

Diet should, in all cases, be carefully considered: sometimes the liberal use of fresh vegetables will regulate the bowels. In other cases, the substitution of bread containing bran, for ordinary bread, succeeds: the good effect is produced by the mechanical action of the bran. It is unsuitable, therefore, for cases in which the gastro-intestinal mucous membrane is irritable. Some articles of diet, as salted meats and fish, hard-boiled eggs, &c., and hard water, tend to confine the bowels, and should be avoided.

Nothing is more important than the culture of habit in moving the bowels, nor is there any

greater source of constipation than inattention to it. If the bowels had been moved daily when the person was in health, efforts of evacuation should be made daily, at a stated period. The best time in general for these efforts is immediately after breakfast. They may be at first ineffectual, but in order to insure success, the plan must be followed systematically and with much resolution. The efforts should be sustained for about ten minutes, and it is surprising how much good is often effected by a persistence in these simple means.

If, however, after a trial of some days, these attempts prove unavailing, the injection of simple water should be had recourse to. A prejudice exists in this country against the enema apparatus, often difficult to overcome. But it is a valuable aid to treatment, and its use is free from the objections to which purgatives are open. At the time already mentioned, let from half a pint to a pint of water slightly warmed, if the weather is very cold, be slowly injected and retained a few minutes, when, with its expulsion, the result desired

will generally be achieved. On the following day, let the natural efforts be resumed; and, if neeessary, the injeetion must be again repeated. Thus employed, the enema will be found most useful in the formation of habit. When the plan recommended is diligently carried out, for about ten days or a fortnight, the natural functions of the bowels are usually restored.

CHAPTER IX.

MINERAL WATERS ADAPTED FOR DYSPEPSIA.

We have in mineral waters a resource for the treatment of many diseases after other measures have failed. Speaking of their effects in disorders of the digestive organs, Sir James Clark, in his work on Climate, says truly: "I consider a well-directed course of mineral water very efficacious, and capable of effecting, in many cases, what no other remedy with which I am acquainted has the power to effect."*

As it is in chronic diseases that mineral waters are most effective, it happens that each water is praised by its respective advocates as a sovereign remedy for the most different affections. And since dyspepsia is not only the source of many chronic disorders, but is

* "The Sanative Influence of Climate." By Sir James Clark, Bart., M.D., F.R.S. 4th Edition.

mixed up with a great number of diseases, it also happens that almost every spa is put forth as a remedy for the disorders of digestion. But although it might, on this account, appear difficult to make a selection, observation and experience enable the impartial observer to select those which are most useful. It is the object of the present sketch merely to indicate by a few remarks in each case, the points which are most deserving of attention. In so limited a space many matters must, of course, be passed over altogether, or only lightly touched upon, that would each require a separate chapter. It will always be desirable for a patient who goes to a spa to consult a local medical man before commencing a course of the waters. Even a single consultation will generally be highly useful. Many errors, as regards the particular spring to be selected, the quantity and the times at which the water should be taken, and the diet to be adopted, will be thus avoided.

Carlsbad waters are highly useful in cases of dyspepsia associated with atonic gout. Flatulence acidity, and occasionally nausea, are common in such cases. These waters are also

serviceable where there is congestion of the abdominal viscera, as shown by increased size of the liver or of the spleen, hæmorrhoids, and other symptoms. They act also as a solvent of uric acid gravel, but in a less degree than the waters of Vichy. The springs of Carlsbad differ little in chemical composition. Their active components are the sulphates of soda and potash, and chloride of sodium, with a small proportion of carbonate of iron. They are well adapted for persons who, although full-bodied, are rather of the lymphatic temperament. A course of these waters is, indeed, often of great use in reducing obesity.

The Carlsbad waters, for reasons already given, are most active when drank at their source. On the other hand, the distance of Carlsbad is a great obstacle. For this reason, I have long been in the habit of prescribing the imported waters. In cases of gouty dyspepsia, a tumbler of the Sprudel water, taken the first thing in the morning for a prolonged period, proves very useful. This quantity acts slightly on the bowels in some persons; but whether it does or not, the effect which is

insensibly produced is generally beneficial. It even seems to avert attacks of gout in those who are not careful as to diet. Indeed, according to my experience, no mineral water is so effective in suitable cases.

Similar in composition with the waters of Carlsbad are the other Bohemian waters of Marienbad and Franzensbad. These waters are used internally in many disordered states of the digestive system, but they are notable for their external use in the form of mud baths, especially those of Franzensbad. In cases of debility, these baths possess a peculiar efficacy by increasing the appetite.

The aperient and antacid waters of Ems are allied to those of Carlsbad, but are milder in their action, and are in much repute for dyspeptic and nervous disorders. These waters are also largely employed externally.

The waters of Wiesbaden are highly useful in dyspepsia, especially in the dyspepsia which accompanies atonic gout. Common salt is the principal ingredient in these thermal waters; and salts of lime, magnesium, and potassium are also present in notable quantities.

Kissengen waters are useful in almost all cases of dyspepsia. The Ragozzi Spring is that which is in most repute, and chloride of sodium, as in all the others, is the leading feature in its composition. Abdominal congestion is relieved by these waters, and they are said to be particularly useful for habitual constipation. Hypochondriacal patients derive great benefit from the Ragozzi Spring. The composition of this water is at the same time tonic, stimulating, and briskly cathartic. This happy combination, in a great measure, prevents the lowering effects which its continued purgative action would otherwise induce.

The waters of Homburg resemble those of Kissengen in composition and mode of action. The agreeable and healthy situation of the place, together with the amusements provided for visitors, render it a specially desirable residence for the dyspeptic invalid.

Dr. Madden, speaking from his own experience of the diseases which are amenable to the waters of Pfeffers, in the Grisons, says that dyspepsia and gastralgia are remarkably bene-

fited by them. He adds, that the irritable stomach tolerates the waters in very large doses, and that "diminution of pain, regular alvine evacuation, and increased appetite" are often rapidly brought about.* It must be added, however, that Dr. Lee states that "these waters possess no advantage over others, where the ordinary conveniences of life and space for exercise are found."†

The waters of Pfeffers are warm and very weakly saline.

No mineral waters are better known than those of Vichy; and the list of diseases which they are reputed to cure is, as usual, a long one. English sufferers from gout regard Vichy literally as the fountain of health, and by these it is annually thronged. Its waters unquestionably possess great curative powers; but, speaking from experience, I must add that they sometimes prove very injurious. Some persons are greatly prostrated by a course of the waters, if long continued. The action of bicarbonate of

* "The Spas of Belgium, Germany, Switzerland, France, and Italy." By J. M. Madden, M.D. London, 1867.

† "The Baths of Germany, France, and Switzerland." By Edwin Lee, M.D. London, 1867.

soda, which is their prineipal ingredient, accounts for this. Some time sinee, a patient assured me that he was comparatively a strong man before his reeent visit to Vichy. This gentleman was suffering from gouty dyspepsia. Opinions differ with regard to the suitability of Vichy waters for cases of gout. By some authorities it is stated that atonie cases, without inflammatory complications, are most benefited; while others (with whom I agree) hold that the inflammatory gout of robust and plethorie individuals is that for whieh these waters are best adapted. But while advising caution in their use, the utility of the Vichy springs in many cases of the gouty diathesis in which dyspepsia is the leading feature, is admitted. The same caution, indeed, which is proper with regard to the exhibition of alkaline remedies in general, should be adopted. After the urine has become alkaline, in the case of subjects who are not robust, it soon begins to deposit phosphates. A rule which I have long followed in this matter is, to suspend the exhibition of alkalies when this happens, and by this means mischief is prevented.

The alkaline waters of Neuenahr, near Bonn, are useful in many cases in which those of Vichy would prove too lowering.*

The bitter waters of Püllna and Fredericks-hall are exceptional, because they are not drank at their source, but always from bottles. Their purgative qualities depend upon sulphates of magnesia and soda. They are available in cases in which a mild saline purgative is desirable. They allay hepatic engorgement, and are useful in dyspepsia with foul eructations, with or without vomiting and headache, as a substitute for the old-fashioned black draught. Püllna water is the stronger of the two. A wineglassful of this, with the addition of the same quantity of warm water, taken the first thing on waking in the morning, generally produces a single increased evacuation of the bowels after breakfast. A larger quantity of this mineral water is, however, sometimes necessary to ensure its action, and upon this point individual experience must be brought to bear.

The Leamington springs furnish a milder

* "The Spas of Europe." By J. Althaus, M.D. London, 1862.

riety of bitter waters. A judicious course of em is of much use in certain cases of engorge- ent in the abdominal circulation. The dry il of the district, and the position of the own, make it also a very desirable health esort.

It must be admitted that the mineral springs of the British Islands are far less known to, and appreciated by, British practitioners than the Continental waters. Nevertheless, the waters of our own country possess high merits as remedies for many diseases, dyspepsia included. Harrogate is the annual resort of many persons in depressed health, who prove, by their repeated visits, their faith in the efficacy of its springs. I have known cases of indigestion much benefited by these waters, which, as they do not keep, must always be taken at their source. Dr. Myrtle speaks highly of the value of the sulphurous springs in gouty dyspepsia, and in constipation from an atonic state of the large intestine.* The

* "Practical Observations on the Harrogate Mineral Waters." By A. S. Myrtle, M.D. Second edition. London, 1869.

waters of Harrogate, on account of their stimulating nature, are indeed only available in cases of dyspepsia unaccompanied by pain or any feverish excitement. The remarkable chloride of iron spring is a powerful restorative in anæmic cases. The climate of Harrogate is healthy and bracing, and its soil is peculiarly dry. The central situation of the town—almost equally distant from the east and west coast—renders it a suitable residence in certain cases where sea air is injurious. Moffat, in Scotland, also furnishes a strong sulphurous water, which is in good repute in that country. Scarborough is another northern locality, formerly more famed for its saline mineral waters than at present. But most dyspeptics will find its keen air, bracing climate, sea baths, and charming scenery highly restorative. In these respects, it may indeed be doubted whether it is equalled by any spot upon our coasts.

This brief notice of the mineral waters which are useful in dyspepsia may be appropriately closed with a few words upon the more decidedly chalybeate waters. It is often proper for the patient who has undergone a course of water,

whose action, although otherwise curative, has been to lower the vital powers, to supplement it with a course of chalybeate water. When the patient is anæmic, such a course alone will in general be sufficient. Owing to the stimulating nature of these waters, some caution is necessary in using them. They are unfitted for persons of plethoric habit, as shown by stoutness of body and high complexion. Dr. Cutler speaks particularly of the value of Spa waters in chronic disease of the liver, attended by oppression after meals, flatulency, coated tongue, sluggishness of the bowels, and other well-marked dyspeptic symptoms.*

The Schwalbach chalybeate waters are deservedly in high repute. They are easy of access, and are largely resorted to by English invalids. They contain the carbonate of the protoxide of iron, which is its most soluble and easily-digested form.

Chalybeate waters are widely disseminated, but of the stronger kinds that of Spa may be regarded as a type. Amongst the weaker waters of the kind, those of Bussang are much

* "Notes on Spa." By T. Cutler, M.D.

employed in France in the treatment of digestive disorders; and in this country the Tunbridge Wells waters deserve more attention than they now obtain. The locality is also well suited, as a summer residence, for the dyspeptic invalid.

The composition of the principal mineral waters is now so thoroughly understood, it might be supposed that by the aid of chemistry, artificial compounds might be produced possessing all the virtues of the original springs. This kind of fabrication is indeed effected with more or less success, some mineral waters being more easily imitated than others. But the artificial waters are, on the whole, inferior to the natural waters. There is probably a subtle property which depends on the peculiar blending of ingredients in Nature's laboratory, which the artificially compounded waters fail to acquire. It is also certain, that in order to ensure the greatest amount of benefit even from the natural mineral waters, it is in most cases necessary that they should be drank at the source. Some waters spoil rapidly from keeping; while others, although exported,

undergo lesser changes from the same cause. The high temperature possessed by many mineral waters when emitted from the earth, also unquestionably increases their medical action.

Besides these considerations, the influence of the change of air and of seene, the substitution, as often happens, of healthful exercise and varied society for a sedentary life, the constant drudgery of a profession, or devotion to business, make residenee at a watering place an essential part of the treatment of dyspepsia.

CHAPTER X.

SLEEP AND SLEEPLESSNESS IN RELATION TO DYSPEPSIA.

The state of the stomach has so direct an influence on the function of sleep, and this function, on account of its bearing on the general health, is so closely associated with digestion that the subject appears to require a separate chapter. But in describing the symptoms of dyspepsia, some matters relating to its effect upon sleep have been previously alluded to.*

All the functions of life intermit, and in every instance rest is in some way or other provided. The intervals which occur between the contractions of the heart afford repose to the organ during about one-fourth of life.

* See page 56.

Owing to the interval between each expiration and the succeeding inspiration, the lungs are at rest during about one-third of the same period. The necessity for allowing the stomach to rest has been fully explained already.* The action of the waking brain is more continuous than that of any of our organs. Even when most passive, thoughts follow each other in a continuous train. But besides the functions of the mind, the brain has other important offices assigned to it in the economy; it presides over and co-ordinates all muscular movements, and takes cognizance of all sensations. It is absolutely necessary, therefore, that the brain itself should have periods of rest.

It has been proved by recent investigations that so far from containing more blood during sleep, as was formerly supposed, the brain contains less than in the waking state. When the circulation in the brain is diminished, it is deprived of the proper stimulus by which its activity is maintained, its vitality is lowered, and it sinks into quiescence. The waste consequent upon its exercise is then repaired.

* See page 6.

The alteration in the cerebral circulation, which is essential to the production of sleep, is effected by the same agency which sustains the action of the vital organs during sleep, namely, the sympathetic nervous system. This subject has been lately ably elueidated by Mr. C. Moore.

In perfect sleep there is no conseiousness, and there is a suspension of all action and motion whieh are under eontrol of the will.

Nothing has a greater influence in producing dreams than indigestion. A late meat supper, taken even by a healthy person when the want of it is not felt, is almost sure to disturb rest and cause uneasy dreams. It is recorded of the authoress of the "Mysteries of Udolpho" that she was in the habit of supping on the most indigestible things possible for the purpose of conjuring up horrors, to be afterwards transferred to her pages. But, as already stated, it is the confirmed dyspeptic who is the chief sufferer from dreams.

The direct communieation between the brain and stomaeh by means of the pneumogastric nerves eauses the funetions of the brain to be disturbed by irritation reflected from the

stomach. The effects of this in producing hypochondriasis have been already dwelt upon.* But when nervous irritation of the stomach from indigested food takes place during sleep, this irritation, when reflected to the brain, becomes a source of frightful dreams. That curious modification of the sleeping state which produces nightmare seems essentially to result from indigestion. The same is probably true of sleep-walking.

Nightmare is in certain respects distinct from ordinary dreaming. While the imagination and the memory possess full fling, the power of the will is either absent or greatly impaired. Respiration is much impeded; and some horrible association of ideas usually springs out of this impediment. All the store of horrors which the mind has accumulated or conceived seem to come up at its call, and to be moulded by it into shape. The sufferer is tortured by demons; he is gored by bulls; entwined by serpents; sat upon by some slimy monster; or drawn by a fiend to the very edge of a precipice, on which he hangs only by

* See page 100.

every effort of his strength. There is often a feeling that such suffering is inflicted through malice, and that some influence is at work against which all resistance is vain. A sense of oppression and want of free action characterise the affection. If the person thinks he ought to run, he finds that he can scarcely move his legs. If he tries to escape through some door or aperture, he finds it too narrow. He fancies himself buried alive, and is unable to turn in his coffin, or to make any noise that would bring him help. If he struggles with some monster, it is only to exhaust himself to no purpose; his toil is only rewarded by the mocking laugh or the demoniacal stare of his tormentor.

Such is an imperfect attempt to describe nightmare; but most readers will be able to complete the picture for themselves in a manner more forcible than can be expressed in words. Sometimes one passes from a state of perfect sleep into that of nightmare; at other times it comes on between sleeping and waking, or when just dropping off to sleep. In general the sufferer is aroused by the violence of the

attack, and it then seems to be thrown off by a great effort of voluntary motion. As soon as the power of volition is established, the attaek is at an end. The heart now beats violently, and a cold shivering often sueeeeds.

Nightmare generally happens when a person is lying on his back, but this is not invariable. What we have said about the eonfusion of time in reference to dreaming applies also to nightmare. It is, therefore, impossible to determine how long an attaek may have lasted. A minute of sueh misery may well appear an hour.

Indigestion is unquestionably the ehief eause of nightmare. Anyone whose digestion is not the strongest may almost infallibly bring it on by taking a late heavy supper. An excellent reeeipt for it would be a veal pie, in which the solid indigestible meat is eombined with pastry. The disorder also plagues people who are asthmatic.

Various explanations of the immediate cause of nightmare have been offered; but impeded respiration is at all events essentially eoneerned. This may be induced by flatulence, whieh

causes the distended stomach to press against the diaphragm, and so interferes with the free motion of the lungs. But an undigested meal lying in the stomach may in another way cause disturbance in the chest. The stomach irritation is then transmitted to the lungs by means of their intimate nervous connection. The cure of nightmare, unconnected with organic disease, consists in avoidance of suppers, attention to diet in general, as well as in a sufficiency of fresh air and healthful exercise.

The proper duration of sleep cannot be absolutely fixed; some men require much more than others; and age, the amount of work performed during the day, whether physical or intellectual, and other circumstances, regulate the demand. Infants sleep the greater part of their time. Children require more than adults, and, as a rule, the middle-aged more than the old. It is no uncommon thing to see old men pointed out as models of early rising to their younger friends. This is a mistake, for in truth the old get up early because they are unable to rest in bed. But there are exceptions to this. Old Parr slumbered away much

of his later life; and De Moivre, when past eighty years of age, slept twenty out of the twenty-four hours. It has also been observed that in the dotage of old age, as if to complete the parallel between the first and the second childhood, sleep again predominates. Sleep in the aged is most apt to occur after meals.

Perhaps no better division of time can be made than the old-fashioned one of eight out of the twenty-four hours for work, eight for recreation, and eight for sleep. The demands of modern life in many instances sadly disturb such a relation between work and relaxation; but the period assigned for sleep seems to accord with general experience. Less than eight hours' sleep is insufficient for most men and women when in health, and more is unnecessary or even injurious. But in this matter there are exceptions. Jeremy Taylor trained himself to exist on three hours' sleep out of the twenty-four. Frederick the Great and John Hunter slept only four or five hours in the same time. Wesley lays down the proper duration of sleep at six hours, and Lord Coke at seven.

The hour of going to bed must of course

depend on the habits of the individual. Persons who get up early must go to bed early, and *vice versâ*. Much has been written in praise of early rising, and with some truth. There is an undoubted relation between sleep and night, when, with few exceptions, all animated nature reposes. It is also a good, though not an indispensable, rule of health to retire to rest early; the real point is to obtain sooner or later the requisite eight hours' sleep.

When the brain is most in action, it attracts to itself most blood. Everyone who has spent many consecutive hours in literary composition, or in abstruse calculation, will be able to recall the sensation of fulness and of throbbing in the head, and, if the work be still persisted in, the headache which such close application often induces. From these considerations it will not be difficult to arrive at a theory of the cause of wakefulness, which facts as well as analogy must lead us to regard as true. Provided that external circumstances are favourable, sleep comes on when that power of the brain through which the mind and the senses act requires to be renovated. It is usually requisite that

access of light and of sound be prevented, and that the body be placed in an easy position. The power of the brain to sustain itself in action may be exhausted more rapidly than ordinary by fatigue, by heat, and by other causes. Habit also, by which all the functions of the body are greatly influenced, has much to do with sleep.

The simplest form of wakefulness, then, is that which occurs from a violation of one or more of the conditions appropriate to sleep. Thus a bright light in the room, an unaccustomed noise, or an uncomfortable bed, suffice to keep most persons awake. An excess in the very causes which induce sleep also commonly prevents it. Over-fatigue is usually followed by vigilance, and some persons are unable to sleep if they remain long out of bed beyond their usual time of retiring to rest; or, on the other hand, if they go to bed unusually early, feel restless and uncomfortable.

When the brain has been once stimulated to activity, it requires some time before the circulation of blood through it regains the balance which is maintained in the waking state.

When in this latter condition, most persons easily fall asleep if other circumstances are favourable. Many people possess the faculty of sleeping at will. A great many persons, on the other hand, and particularly those of nervous temperament, sleep with difficulty, and some may be said to obtain repose only by stratagem.

Any intellectual effort immediately before retiring to rest is sure to be followed in such persons by a restless night. If, for example, a game of chess has been played, the various moves and positions on the board are long vividly present before the mind. This misfortune is only to be averted by avoiding the causes which induce it. If, on the contrary, the circulation in the brain is habitually kept at an unnatural tension, the difficulty with which it returns to the state necessary for sleep is nightly increased.

Another great enemy to repose is an over-active imagination. A man whose thoughts run riot, so that with closed eyes he sees mental pictures pass in rapid succession, like a vast panorama, will never sleep as long as this state of things continues. One great essential for sleep is simplicity of mental action.

Many articles cause wakefulness when taken internally. Of these, tea and coffee are the most familiar. Everyone knows that either, but especially tea, when taken too strong, prevents sleep. Opium, belladonna, or Indian hemp, in small doses, produce the same effect. There are good reasons for believing that all these articles act alike, in at least one respect, namely, by increasing the circulation of blood in the brain. This is attended by increased activity and power of thought. Each of these substances has also a specific action of its own. There is even a difference between the stimulation caused by tea and by coffee.

It might be supposed from analogy derived from the lower animals, that to sleep long after meals was natural. Such, for instance, is the habit of the dog; but it is also the habit of this animal to swallow his food almost without any mastication. The healthiest human stomach would rebel against such treatment, and so also few persons can eat heartily with impunity immediately before a prolonged sleep. It is true, that if the want of food is felt, it will be borne much better than otherwise. Nor must the relation between what is proper

for the invalid and the man in health be forgotten.

Sometimes, however, the tendency to sleep after dinner is almost irresistible. A short nap of from twenty minutes to half an hour is generally, in such cases, and particularly for old persons, salutary. It should be taken soon after the meal, because sleep is then more refreshing than when the process of digestion has advanced further.

Indigestion is, perhaps, the most common and unsuspected cause of wakefulness. Anything which acts as an irritant to the stomach is apt to irritate the brain, by means of the close union which exists between these organs. It must be borne in mind that when irritation is reflected from the stomach to the brain, the ordinary dyspeptic symptoms are often either very trifling or not present.* For this reason, this cause of sleeplessness is very commonly overlooked.

On the other hand, that kind of exhaustion which occurs from want of food frequently prevents sleep. When a person accustomed to

* See page 96.

dine late happens to dine early, and goes to bed without any substantial refreshment, he is very liable to find himself utterly sleepless. It may be that no actual hunger is experienced; it is rather a sensation of sinking in the region of the stomach. This kind of sleeplessness is very persistent, because the exhaustion increases in proportion to the time during which the person remains awake. In such a condition, a sandwich and a glass of wine or a draught of ale act better and more speedily than an opiate. No sooner has food been taken than a sense of comfort and a tendency to repose succeed, and the person soon falls into refreshing sleep. It is not difficult to comprehend how this occurs: the brain in its previously vigilant state was too full of blood, by which its unnatural activity was sustained. When food is taken into the stomach, the process of digestion is excited, and the superabundant supply of blood is, by this means, diverted from the head to the abdominal viscera.

Another cause of sleeplessness is the misuse of alcoholic drinks. In a great number of instances, stimulants do not agree with the

system, and many people would sleep much better if they abstained from them altogether. This is not inconsistent with the fact, that a certain dose of brandy and water or its equivalent is considered by some persons indispensable for sleep. Anything to which the system has become habituated grows into a necessity.

In the treatment of sleeplessness, it will therefore be generally essential to prevent the use of tea and coffee, and frequently of all alcoholic stimulants. The patient should take care that he does not go to bed with cold feet, or with a stomach that has either been too long empty or too recently called upon to digest solid food.

CHAPTER XI.

A BRIEF STATEMENT OF THE PHYSIOLOGY OF DIGESTION.

THE simplest conception of the human digestive apparatus is an elongated cavity, in the upper part of which a fluid is secreted which possesses the power of reducing solid food to a pulp. Water, and certain portions of the aliment dissolved in it, are taken directly into the blood through the porous sides of the veins spread over the walls of this part of the cavity. But the pulp itself reaches the same destination by another route. It is taken up by certain minute tubes—the absorbents—which communicate between a different portion of the cavity and different veins.

If, however, we regard the alimentary canal as including gullet, stomach, and intestines,

simplicity vanishes. Not only are the general dimensions of this elongated cavity very different at different points, but it is subject throughout to considerable alterations in size from expansion and contraction. The food is taken into the stomach, rolled about while there, and then propelled through the intestines by muscular contrivances of singular ingenuity.

The mode in which absorption and secretion are connected with the minute cell-mechanism of the stomach and intestines is next to be considered. We find the mucous membrane not only the agent by which the blood is replenished by absorption, but also the medium through which certain fluids are copiously poured into the digestive cavity itself. We observe that the membrane is in some places studded with innumerable points—the mouths of minute secreting organs; and we discover large supplemental organs—the liver and pancreas—intended to prepare elaborate fluids to be sent into the common reservoir. By continuing the investigation, we find that the parts and functions of the digestive organs are

most complicated, and that some, as yet, baffle investigation.

As the actions to which food is submitted are performed within certain mechanical limits, they may be classified in four groups. These are—

The actions of the mouth and gullet.

The action of the stomach.

The action of the small intestine.

The action of the large intestine.

In the first group, mastication and insalivation claim especial attention; and one peculiarity of these actions is, that they are visible to us. The familiar act of chewing is seldom a subject of reflection, yet it throws into motion a more complicated system of levers, accompanied by a drain of fluids from more curiously adapted apparatus than the arts can parallel. Another point of more practical importance is peculiar to this group—the actions which compose it are, for the most part, within control. Food may be well or badly chewed as we please: once beyond the portals of the throat, this transient power over it is lost. The pleasures of taste may beguile; inattention or voracity

may induce us to eat too rapidly or too much; but nature, in general, punishes the transgression, and the man of weak digestion suffers especially. Gastric sensations are experienced that should have no existence, and dyspepsia is produced.

By the crushing and dividing action of the teeth, the food is reduced to a condition adapted to the operation of its proper solvents. The necessity for sufficient mastication is proved by the evidence of design in the form and arrangement of the human teeth; and these also afford conclusive arguments in favour of a mixed animal and vegetable diet.

During mastication, the salivary fluids become intimately mixed with the food. Mastication is itself aided by this, while the food is prepared for the action of the gastric juice. The chemist frequently employs water as a like means of preparing substances; but saliva is much better adapted than water for blending with many substances used as food. The numerous air bubbles for which saliva is remarkable have their special purpose, since the presence of atmospheric air in the stomach is accessory to

digestion. But an essential use of insalivation is lubrication of the morsels: without this, it would be impossible to swallow certain kinds of food.

Besides these uses, saliva has at least one well-ascertained chemical action: it possesses the power of converting starch into sugar. As this action continues in the stomach, it is probable that saliva exercises an important influence in the digestion of farinaceous substances.

Saliva being formed by several glands which have their outlets in the mouth, consists of a mixture of secretions differing considerably in their nature. It has been ascertained, by means of tubes passed into their respective ducts, that the secretion of the parotid gland contains little solid matter, and is of the consistence and colour of water, while the syrup-like fluid of the sub-maxillary and sub-lingual glands contains a larger proportion of solid constituents.* Numerous follicular glands of the mucous membrane of the mouth also con-

* Compare C. Bernard, in *Medical Times and Gazett* June 16, 1860.

tribute their secretions to form the saliva: in a healthy state, it always possesses an alkaline reaction.

Now, it seems certain that these various fluids have their peculiar functions. As the parotid and sub-lingual secretions are most abundantly poured out during mastication, these are chiefly concerned in the dilution of food. The supply from the sub-maxillary gland is greatest at the moment of swallowing; and to assist this, its lubricating secretion is admirably suited. The chemical effects of saliva appear mainly due to the secretion of the minute glands of the mucous membrane of the mouth.

Great difficulty exists in estimating the quantity of saliva. It is chiefly regulated in health by the requirements of mastication, and is, therefore, like gastric juice, proportionate to the aliment. The conclusions of Bidder and Schmidt give, as the average amount, about three pounds of saliva in twenty-four hours, although its secretion appears to be arrested during sleep. I have, however, satisfied myself, from numerous experiments, that the average

amount of saliva secreted in the time mentioned is about one pound.

Certain stimulants greatly augment the flow of saliva. Tobacco-smoking is the cause in some persons of an immense loss of the secretion, not the least injurious consequence of the habit.

It was often observed, when hand-spinning was the custom, that women so employed became very thin. This was with good reason attributed to the waste of saliva occasioned by the constant necessity of wetting the fingers during the process.

The flow of saliva is also governed by certain mysterious sympathies. It can be increased by merely directing attention to it; so, when the appetite is keen, not only the smell or sight of savoury food, but even the idea of it produces a like effect.

Besides a number of other substances in solution, saliva contains one that is peculiar to it, and another which, until lately, was supposed to exist in no other animal fluid. The first of these is ptyalin, which forms about one and a half per cent. of the whole, and to it are due

the characteristic smell and known chemical properties of the secretion. The other, sulphocyanide of potassium, exists in smaller proportion, and from its constant presence, would seem to answer some important though unknown purpose in the secretion.*

The act of swallowing is succeeded by a series of alternate relaxations and contractions throughout the long tube of the gullet, by which the morsel is propelled downwards into the stomach.

In shape the stomach has been aptly compared to the pouch of a bagpipe, which it closely resembles. It is capable of great alteration in size. In the dead subject I have found its average capacity when completely distended about two quarts. The stomach is furnished with two apertures—the cardiac orifice, at its left or larger end, or that at which the gullet opens, and the pylorie orifice, which leads into the small intestine on the right. The walls of the stomach, consisting of

* See a paper by the Author, "On the Presence of Sulphocyanides in the Blood and Urine." Proceedings of the Royal Society. No. 114. 1869.

DIAGRAM OF THE DIGESTIVE TUBE.



1. The Gullet.
2. The Cardiac orifice of the Stomach.
3. The lesser curvature of the Stomach.
4. Its greater curvature.
5. The Pylorus.
6. Superior portion of Duodenum
7. Perpendicular portion.
8. Inferior portion.
9. Gall Bladder.
10. Bile Duct leading to the Gall Bladder.
11. Bile Duct leading from the Liver.
12. Common Duct, formed by junction of two preceding.
13. Its aperture in the Duodenum.
14. Duct of the Pancreas, opening into the Duodenum close to where the Bile Duct opens.
15, 15, 15, Jejunum.
16, 16, 16, Ileum.
17. Ileum opening into Great Intestine.
18. Ileo-cæcal Valve.
19. Cæcum.
20. Vermiform Appendix.
21, 21. Ascending Colon.
22. Transverse Arch of Colon.
23. Descending Colon.
24. Sigmoid Flexure of Colon.
25. Rectum.

three coats, namely, a very thin external covering of serous membrane, a middle muscular layer, and an internal mucous lining, do not, taken together, exceed the thickness of ordinary cardboard. Considering the powerfully solvent action of the fluid it secretes, one would be disposed to wonder that so delicate an organ is not self-digested. Dr. Pavy has offered an ingenious and apparently conclusive explanation of this difficulty.

On reaching the stomach, the food is again, by aid of muscular action, brought into contact with a new secretion. In an account of this occult process, the observations of Dr. Beaumont, in the remarkable case of Alexis St. Martin, are indispensable.* Dr. Beaumont observed that food which had passed from the gullet to the stomach, immediately commenced a series of revolutions. These revolutions are made from right to left, and are completed in from one to three minutes. They become quicker as the reduction of the food into chyme progresses.†

* See page 20.

† See woodcut. The morsel, on reaching the stomach

During the time of these motions, the pyloric extremity of the stomach is in a state of contraction, but allows the food, when reduced to a pulpy mass, or chyme, as it is then termed, to pass into the intestines. A full meal is thus gradually diminished until the stomach becomes entirely empty. Should, however, injurious substances or indigestible food be present, the organ becomes at last weary of its efforts—the contraction of the pyloric orifice gives way, and the undissolved residue enters the intestines, and therein becomes a source of irritation.

Obviously, then, the use of this persistent churning is, that every portion of the alimentary mass shall be quickly brought into contact with its liquid solvent. The chemist, with the same intention, shakes up substances when he wishes to hasten solution; but in the case of the stomach, the constant removal of dissolved portions must greatly assist further action.

This solvent, or gastric juice, is the product

by the cardiac orifice (2), passes round the greater curvature (4) to the pyloric orifice (5); thence by the lesser curvature (3) to its point of departure, when a new revolution is commenced.

of small tubular glands with which the entire mucous surfaee of the stomaeh is studded. There is nothing in the physieal properties of the fluid to indieate its potency. Clear, eolourless, and very slightly viscid, it is moderately acid during healthy digestion, while the seanty secretions of the empty stomaeh are neutral or alkaline. Certain minute and somewhat peculiar bodies (rennet eells) are discoverd in the gastric juice by means of the mieroscope. They are formed in the tubular glands of the stomaeh; but whether they really possess properties conveyed by the name given them is not settled. Freriehs believes that they supply the true gastrie ferment.

But what is this gastric ferment? We have seen that the peculiar properties of saliva depend on the presenee of ptyalin. In gastrie juice we find another peeuliar albumen-like substanee, and this is termed pepsin. The aetion of this pepsin is devoted to that important elass of alimentary substanees into whieh nitrogen or azote enters, ineluding the flesh of animals, fish, and eggs. As regards solution, there are few more refractory substances, yet

they are readily reduced by the gastric juice to a mass uniform in physical as well as chemical qualities. Its action also causes substances which are in an eminent degree prone to coagulation—as, for example, milk—to lose that quality, besides producing other changes. On this account, the reduction of azotized food in the stomach is regarded as including not merely solution, but the formation with the gastric juice of new compounds. In recognition of the agent indispensable to these changes, the compounds have been termed "peptones."

As for the starchy and fatty elements of food, they undergo no changes from the secretions of the stomach, beyond minute subdivision.

The amount of pepsin in gastric juice is exceedingly variable, but seems to be in proportion to the nature of the food. In the case of carnivorous, it is much more copious than in that of herbivorous animals. In man the proportion appears to hold a medium place, but to be still remarkably influenced by diet. The analyses of gastric juice obtained by Dr. Grunewaldt, from a woman who had an external

opening into her stomach, yielded 36·6 parts of pepsin in 1000 of the juice. The patient was then well fed, but subsequently returned to her accustomed and poorer fare. Analyses of the gastric juice then made by Dr. Schroder yielded only 3 parts of pepsin in the 1000 of juice. It has been repeatedly proved that alimentary substances undergo solution in gastric juice out of the body with considerable facility.

Acidity is an invariable property of gastric juice secreted during digestion. Yet, strange as it may seem, chemists have not been able to determine the particular acid always present. The truth is, several acids are found in human gastric juice, but the question of the essential acid may be regarded as now narrowed to two —the lactic and the hydrochloric: at one time hydrochloric was in the ascendant; but more recently, in some carefully conducted experiments by Dr. Smith, of Philadelphia, on gastric juice obtained from St. Martin, lactic acid was found to be "the main agent in producing the characteristic reaction." *

* Experiments on Digestion, by F. Smith, M.D., page 11, Philadelphia, 1865.

Copious as the saliva is, the gastric juice far exceeds it in quantity. The estimate of Dr. Schröder is one of the latest and perhaps the best. He tells us that the average amount secreted in twenty-four hours by the woman previously mentioned was fourteen kilogrammes, or upwards of thirty pounds.* This is astonishing, and reveals to us an immense water circulation between the blood-vessels and the alimentary tube. It is plain that if the secretions of which this tube is the receptacle were not taken back into the blood, we should be obliged to drink much more largely than we do.

It was proved by Dr. Beaumont that the amount of gastric juice is regulated by the amount of food required by the system, and is not always in proportion to the quantity swallowed. As an alkali will only combine with an acid in a definite proportion, so a given quantity of gastric juice will only dissolve and combine with a proportionate quantity of food. Any surplus of the latter thus

* Succi Gastrici Humani Vis digestiva, ope fistulæ stomachalis indagata. Dorpati, 1853.

becomes a cause of distress either to be got rid of by vomiting, as commonly happens in the case of children; or, what is far worse, is passed into the intestines, which are then fretted by its presence.

Besides gastric juice proper, the stomach, especially when empty, secretes tenacious mucus, which forms a thick protective sheathing for its internal surface.

The food on passing out of the stomach by the pyloric opening, so named from its gate-like valve, enters the small intestine. The pulpy mass is now slowly propelled through this narrow and tortuous tube, measuring about twenty-five feet in length. The artificial divisions of this intestine into duodenum, jejunum, and ileum, need not detain us. But the first part, about twelve inches long, known as the duodenum, has some interesting characteristics. Its fixed position is clearly destined to prevent the food passing too rapidly out of the stomach, and displacement of the latter organ is thus prevented. The contributory secretions of the liver and pancreas are poured into the upper part of the duodenum.

The sensibility of the duodenum is greater than that of any other part of the alimentary tube. This sensibility seems intended for supplying the chyme, as it passes from the stomach, with its due proportion of bile and pancreatic juice. The flow of these secretions is probably regulated by the quantity of material which passes over the sensitive intestinal surface, and a nervous connection between this surface and the liver and pancreas would account for the regulated supply. This would certainly be analogous to what happens when a flow of saliva is produced by the contact of a morsel of food with the interior of the mouth. Now, it is proved by experiment, that the supply of bile and pancreatic juice is suspended when digestion ceases, and in cases of death, after long abstinence or from starvation, the gall-bladder is invariably found full of bile.

The stomach and duodenum are constantly alluded to by old writers under the title of the "primæ viæ," and the passage through them of "crudities," or badly digested food, was justly regarded as a source of varied ills.

Chyme receives in the small intestines the

name of chyle. It is now coloured by the bile, and its fatty portions are, as we shall see, acted upon by the pancreatic juice. But the chyle is here further elaborated, for the small intestine not only receives the several digestive fluids, but secretes a proper solvent juice. Yet this tube, when compared with the stomach, must be regarded as essentially a medium for absorption. Water, and substances soluble therein, are directly absorbed by the blood-vessels of the stomach; but here we find, in addition, oily and chylous matters in general, taken up with a like facility. For these purposes the villous, or velvet pile-like surface of this intestine, is specially adapted; and the distension of its lacteal vessels, as seen in an animal killed soon after a meal, proves how actively they absorb chyle. Numerous folds of the intestinal mucous membrane are intended to assist the process by increasing the surface to be traversed by the food, and delaying its passage. But the subject of absorption can hardly be brought within my present limits.

Owing to the difficulty of obtaining unmixed intestinal juice, estimates of its quantity are

little to be relied upon. It was set down by Haller at eight pounds in twenty-four hours, while half a pound in the same period is the estimate of Bidder and Schmidt. A marked differenee exists between the products of the gastrie and the intestinal glands: the intestinal juice is alkaline, and its solvent power is not interfered with by the presence of bile, as in the ease of the gastric seeretion. The properties of dissolving albuminous substanees, and of converting starch into sugar, are eertainly possessed by the intestinal juice. We may, therefore, regard it as supplemental to the gastric juice and saliva, and, as we shall presently see, it eo-operates with the panereatie seeretion in the manufaeture of sugar.

The secretion of the small intestine must neeessarily be intermixed with all the other seeretions which flow into its cavity. A eombination is thus formed probably eapable of redueing such alimentary substances as had eseaped solution in the stomach, for of the existenee of intestinal digestion there is no doubt.

The large size, the shape, and the position of

the liver, make it, even in a popular sense, one of the best-known organs of the body. No organ is so much maligned as the liver. Pains and various ill effects are daily attributed to it, or its responsible agent, bile, of which both are guiltless. Nor can it be denied that this hostile feeling is much encouraged by practitioners, who find the liver a convenient scapegoat. The truth is, we have much to *unlearn* as well as to *learn* about the diseases and the functions of this gland.

Modern researches prove the liver to be an active agent in nutrition. It separates sugar from the blood, which sugar, as shown by Dr. Pavy in the "Philosophical Transactions," is transformed into amyloid substance, which is probably converted into fat, while it also secretes bile. Most of this secretion is absorbed again into the system with the food. Bile is rather accessory than indispensable to digestion. Dogs in whom the flow of bile is directed outwards through fistulous openings, so that none of it passes into the intestines, may, as M. Blondlot has proved, live on for years. The chief obvious effects of such an operation

are voracity, loss of weight, flatulence, and a putrescent tendency in the intestines when the animals are fed on meat.

Bile, as found in the human gall-bladder, is a viscid, greenish-yellow coloured fluid, having a bitter taste, the intensity of which is proverbial. Its principal organic constituent is glyco-cholic acid, and this is united with alkalies, of which the principal is soda. To these alkalies the well-known cleansing properties of ox-gall are mainly due; but when quite fresh, bile is neutral. It seems that untimely decomposition of animal food is prevented by the bile; and it also appears effective in preventing the fermentation of starchy food. That bile is concerned in the assimilation of fat is more than suspected; but how it effects this is not well understood. The quantity of bile secreted in twenty-four hours is estimated at between three and four pounds.

The pancreas, or sweetbread, as it is termed in the lower animals, resembles a salivary gland seated in the abdomen. In structure the comparison is almost complete, and in physical aspect pancreatic juice is saliva with-

out air-bubbles. The pancreatic juice is alkaline, like saliva, and like it, contains a small proportion of a peculiar principle. But the quantity of these fluids appears to be very different. The amount of pancreatic juice secreted in twenty-four hours by a man weighing one hundred and forty pounds, has been estimated by Bidder and Schmidt at seven ounces. Considering the size of the gland, and the apparent importance of the secretion, I cannot help believing that the quantity is greater.

Like saliva, pancreatic fluid converts starch into sugar; but the latter secretion also exercises a peculiar action on fat, the precise nature of which must be regarded as *sub judice*. M. C. Bernard asserts that the juice forms, with fat, an emulsion which is then absorbed. I believe, however, that pancreatic juice really decomposes fat by separating the olein or absorbable part from the margarin and stearin, and that these latter substances are excrementitious.*

* I venture to refer the reader to my observations on this subject in the *Medical Times and Gazette*, June 3, 1854.

A very important action has been attributed to the pancreas by Baron L. Corvisart. He asserts that its fluid exercises an energetic digestive power over albuminous substances, and that the action of the organ is, therefore, supplementary to that of the stomach.* Supporters of this view are not wanting, while on the other hand, objections, backed by experiments, have been made against it.

Some important inferences may be drawn from the foregoing statement. Different elements of food are digested by the action of different organs. The starchy portions are transformed into sugar by saliva, which renders them capable of being absorbed from the stomach into the blood. Gastric juice dissolves the albumen, fibrin, casein, &c.; while, whatever other function the pancreatic secretion possesses, it is certainly concerned in the digestion of fat. By the admixture of the proper fluid of the small intestine with all the foregoing, as well as with bile, a compound is

* Sur une Fonction peu connue du Pancréas. La Digestion des Aliments Azotes. Par Lucien Corvisart. Paris, 1857-58.

formed which comes nearer the character of a universal solvent than any of the secretions possess singly. In the small intestine, then, the solution of all the principles of food is at length accomplished; and it is here also that absorption of all substances which are not entirely soluble in water is effected.

The large intestine is about a fifth of the length and twice the diameter of the small intestine, from which it is separated by the ileo-cæcal valve.*

It consists of three parts. The cæcum, which the small intestine joins, has attached to it a short gut, about three or four inches in length and the thickness of a quill, called the vermiform appendix. Closed at one end, it opens by the other into the cæcum. It secretes thick mucous, which appears to be provided to assist in expelling the fæces, since they attain a semi-solid consistence in the lower bowel. The opening of the ilcum into the cæcum is provided with a valve so designed as to allow free passage of matters into the large intestine, but to prevent their return. The colon constitutes

* See woodcut, page 225.

the principal part of the large intestine, and, from its power of expansion, is very capacious. It ascends at first towards the liver, passes horizontally below the stomach, descends by the left side of the abdomen, and after a peculiar flexure, ends in the rectum. The internal surface of the colon presents a number of cavities or cells, designed to promote the gradual descent of the excrement. But when the action of the intestine is weakened, these cells cause great inconvenience by retaining the fæcal matters. The rectum is a continuation of the colon, and is the last portion of the intestinal tube. Straight in its course, as its name implies, it also is capable of great distension.

There is no immediate connection between the amount of food and the bulk of the fæces. The lungs, the kidneys, and the skin, form additional outlets for any overplus of digested material. The chief contribution from the small to the large intestine is the trifling residue of food which escapes digestion and absorption, comprising hairs, portions of bone, kernels and the husks of seeds, the internal woody fibres of vegetables, and such refractory substances.

By far the largest portion of the fæces is thrown out by the minute glands of the colon. This acid excretion is characterised by a disagreeable but not naturally a putrid odour, and consists, like the solids of the urine, of material removed in the renovation of the body. The large intestine is a main sewer, with numerous contributories, — a reservoir for waste, to be periodically emptied.

The large intestine does not appear to possess any digestive powers, although it is capable of absorbing substances in solution. This capacity probably increases vicariously when that of other portions of the alimentary canal is interfered with, for in such cases, nutritive enemata are of the greatest service.

The gases of the alimentary canal hold a position of importance, as we always find the healthy stomach and intestines somewhat resonant on percussion. Obviously, then, a certain amount of gaseous distension is useful and necessary. Carbonic acid and nitrogen in large proportion, with some oxygen and a little hydrogen, are the gases commonly found in the stomach and small intestines; while

besides all these, sulphuretted and carburetted hydrogen are found in the large intestine. For some of these gases we can easily account. A considerable amount of common air is constantly swallowed, entangled in saliva, and we accordingly find the components of air in the stomach, but with a diminished proportion of oxygen; and in the intestines this is still more the case. A portion of the oxygen is supposed to be taken up by the capillaries, while a portion of it combines with the food. Some authorities maintain that gases emanate from the mucous membrane, but in proof of this nothing positive can be advanced. Fermentation and putrefaction of food must account for the presence of the other gases, as they do not exist in the blood, and cannot be derived from the atmosphere.

In concluding this brief sketch of the physiology of digestion, let me again draw the reader's attention to the large quantities of several of the digestive secretions. In a man weighing ten stones, or one hundred and forty pounds, they reach in the aggregate, in twenty-four hours, to a sixth of his weight; at least,

this is borne out by the preceding data. But obviously it is not merely quantity, but quality of secretion that is essential. These abundant and elaborate compounds are to be regarded as products of the entire economy—not merely of the glands from which they respectively flow; and nothing is more essential to the due performance of secretion than a healthy state of the nervous system.

APPENDIX.

A.

Experiments as to the Cause of Heartburn.

The term cardialgia, or heartburn, is variously interpreted both by the profession and by patients. Some understand it by epigastric pain with a sensation of heat; some include under it the pain which accompanies pyrosis; while others restrict it to a peculiar scalding sensation, extending from the cardiac orifice of the stomach along the œsophagus to the mouth. The latter appears to me a proper restriction, and my present observations will be confined to the affection as thus understood. Various explanations have been offered of it. Dr. Copland, speaking of heartburn, says, "It is generally attended by acid or acrid eructations, exciting irritation in the throat and fauces." Dr. Chambers tells us that heartburn may be looked upon as the milder disease of which water-brash

is the severer development, but that fluid is in no case concerned in producing the sensation, which is a "spasmodic pain in the œsophagus."

From the testimony of many patients, as well as my own experience, I maintain, however, that heartburn is usually attended by the ejection from the œsophagus of a very small quantity of acrid fluid, frequently described as a single drop, causing a peculiarly disagreeable and occasionally a greasy taste in the mouth. Gas from the stomach sometimes accompanies the drop, and to this is probably due the idea conceived by some patients that the sensation resembles the "passage of hot smoke."

On considering the taste experienced as well as the conditions under which heartburn comes on, it seemed to me that the cause of it was the presence of butyric acid. This acid is a product of deranged digestion; and the disgusting smell of vomited matters, from which I have by distillation obtained butyric acid in considerable quantity, is chiefly caused by it. Heartburn is very generally induced by eating food in which butyric acid already exists, as pastry, &c., and the acid is also formed out of its elements in the stomach. The removal of heartburn by alkalies affords proof that it is caused by an acid.

But if my supposition were correct, heartburn would be produced by the passage of butyric acid down, as well as up the œsophagus. To test the matter, I obtained some pure acid, and experimented on myself and on two gentlemen, who from actual experience of true heartburn, were competent judges. The plan adopted was to dip a pill of some inert substance stuck on the point of a long needle into butyric acid, either pure or diluted. The pill was then carried by means of the needle to the back of the tongue, without touching the interior of the mouth, and swallowed. The taste and sensation produced in the œsophagus were pronounced in every instance to be identical with ordinary heartburn, but varying in degree according to the strength of the acid; and in the case of one of the gentlemen, the sensation extended to the stomach. Moreover, as in heartburn itself, a small quantity of alkali at once gave relief.

My explanation of the production of heartburn, founded on the preceding observations, is as follows:—In certain weak conditions of digestion, or when it is overtaxed, butyric acid is set free from food in which it existed, or else it is formed out of the elements of starchy food, as is well known to be possible. The acid being in excess, but not

pure, or else it would be soluble, rises to the surfaee of the eontents of the stomaeh, where it eombines with melted fat, for which it appears to possess a strong affinity. The acrid mixture, on being presented to the cardiae orifiee by the motions of the stomaeh, is instinctively rejected into the œsophagus, and by the reversal of its proper movements transmitted to the mouth, aeeompanied by the sensations of heartburn. The ease with whieh fat mixes with butyrie acid explains the relief of heartburn by cod-liver oil.* It acts by diluting the aeid.

* See page 177.

B.

Flatulence and its Successful Treatment by a Novel Use of Charcoal.

The stomach and intestines always contain gases. They seem both, in a chemical and mechanical point of view, to be essential to digestion. A good deal of common air is swallowed with the food, and the remarkable facility with which air bubbles are formed in saliva is referable to this special purpose. It follows that oxygen and nitrogen are natural to the stomach, and it has been well ascertained that nitrogen is greatly in excess of oxygen, showing that even in the stomach this gas is in some way employed in the vital processes. But as gases are easily evolved by fermentation, and as saccharine and other fermentable matters dissolved in water are present in the gastro-intestinal tube, it results that its aëriform contents are far more complex. Perfectly healthy digestion probably does not admit of ordinary fermentation; but it is certain that a very slight defect in the process gives rise to it, and carbonic acid is then

freely formed. Gaseous distension of the stomach and bowels thus becomes one of the most troublesome complications of dyspepsia. In the stomach carbonic acid, and more rarely sulphuretted hydrogen, known by the characteristic taste of the eructations; and in the intestines these gases, as well as carburetted hydrogen, are the sources of trouble.

Two other causes of flatulence have been advocated, and the suddenness with which it is occasionally developed, lends them some support. It has been supposed that gases are disengaged into the intestines and stomach from the blood in their capillary vessels. No satisfactory proof of this theory has been offered, and the gases of the blood do not bear such a proper relation to those of the digestive tube as to make it probable.

According to a theory of the late Dr. Brinton, a sudden relaxation of the abdominal muscles, as well as of the proper muscles of the stomach and bowels, permits an equally sudden expansion of gases that had been previously compressed within these hollow viscera. It is true that gases being elastic, become under sufficient pressure greatly diminished in bulk, and that they expand in proportion when the pressure is removed. But to account for flatulent distension on this principle, an amount of pressure

must be presupposed, which is *primâ facie* improbable. To test the matter, I tried the following experiment :—

An elastic india-rubber bag one inch and three-quarters in diameter, when filled, the sides being one-twentieth of an inch thick, was introduced into another bag of the same dimensions. A stop-cock was adapted to the inside bag, and both were then forcibly distended with carbonic acid introduced into the inner bag until the outer one measured three inches and two-thirds in diameter, when escape of the gas was prevented by turning the cock. The gas was thus, by the elasticity of the bags, subjected to a much higher pressure than any ever likely to be steadily and uniformly exerted upon the contents of the gastro-intestinal tube. The outside bag was then removed by cutting, when, allowing for its thickness, the diameter of the bag still inflated was found not to have enlarged in an appreciable degree. Here the removal of the outer bag represented a sudden relaxation of the muscular force by which the stomach is compressed; and, supposing the pressure of both the elastic bags to have been only equal to what may affect the stomach according to the theory in question, expansion of the gas in the remaining bag was

to be expected. But as no change resulted, I infer that no pressure can possibly be exerted on the gases in the alimentary cavities sufficient to produce by its withdrawal the phenomena of marked and sudden *flatus*.

My explanation of the sudden occurrence and disappearance of flatulence is this :—If a bladder be half filled with air, and it be then compressed in one part, the air will accumulate in the part not so compressed. Now, we know that local and irregular contractions of the intestinal tube are not infrequent. The hour-glass contraction of the stomach is an example of it. In the spasmodic conditions which hysteria often presents, sudden contractions of parts of the alimentary tube also take place, and the gas normally present in these parts having been suddenly displaced, accumulates in the uncontracted parts. The result is precisely that described as occurring in the case of the flaccid bladder when compressed,—the gases rushing from one part of the intestines into another, and from the small intestines into the stomach, cause sudden dilatation. The subsidence of compression in the one case as well as in the other, explains the equally sudden removal of distension.

When physician to the Smyrna Hospital, during

the Crimean war, I witnessed several cases in which distension of the digestive cavity was induced, apparently by the marvellous ingenuity of soldiers in feigning diseases. Several of our patients became affected with "phantom tumours" of the abdomen. Their seat was usually the hypochondriac region of either side, and their size about that of a cricket-ball, which in firmness they almost resembled. We could not explain their production beyond the fact that the voluntary muscles had much to do with it. When the subject of such a tumour was brought under the relaxing influence of chloroform, the tumour invariably vanished without any expulsion of gas. It is now plain to me that they were caused by the joint, and so to speak, educated action of the muscles of the abdomen and diaphragm. The gases were by their means dislodged from some parts of the alimentary tube while they accumulated in others, as already said occurs in hysteria from an involuntary muscular action.

The relative amount of each gas in the alimentary tube greatly depends on the nature of the food, but nitrogen seems to be mainly the natural distending agent. Flatulence consists, then, in the exaggeration of a natural condition, of which there

is probably no normal standard, and it occurs in every degree up to complete distension. When it is in excess, interference with the peristaltic motions of the tube, and therefore with digestion itself, ensues. The functions of adjacent vital organs also become seriously impeded by pressure, and dyspnœa, palpitation of the heart, or intermission of its action, result. If the muscular coats of the stomach and bowels are vigorous, the natural efforts are followed by expulsion of a portion of the gas, and this may generally be aided by stimulating remedies, carminatives, as they are called. But distension causes a temporary paralysis of these coats; and hence we are often told by patients suffering from this cause, that if they could "only get a little wind off the stomach much more would soon follow." The contractile power recovers itself as soon as the force which overpowered it is lessened.

The remedies for flatulence may be classified as follows into—

Those which prevent fermentation;

Those which favour the expulsion of gas;

Those which absorb gases.

The first and second need not at present delay us. Medicines are in common use for these purposes.

Such is not the case with those intended to relieve tension by direct absorption of gas—a mode of treatment specially adapted to gastric flatulence. Indeed, I am not aware that any writer has advised medicines to be given with this special object.

Some time ago, I attended, with Mr. Spencer Wells, a case of albuminuria, with disease of the heart and other complications, in which flatulence was most refractory. The subject of it was a gentleman of the highest intelligence, and he often assured me that his other sufferings were trifling compared with what he endured from that single cause. Unable to lie down at night, the day was miserably spent in search of even temporary relief. "Such," he would graphically say, "is my utter prostration, and at the same time horrible restlessness, that I feel like a worm that had been trodden upon." The usual stomach remedies, including charcoal-lozenges, were ineffective. It was then that the idea occurred to me that charcoal, administered in a new form, was a promising remedy. Charcoal is not unfrequently prescribed in cases of flatulence, but the conditions necessary for success are not fulfilled. These are, that it shall be taken into the stomach dry and in a fresh state.

About thirty years ago Dr. Belloc, a retired

French officer, turned his attention to charcoal as a remedy for dyspepsia. He suffered from the disease, and had therefore an opportunity of experimenting upon himself. After many trials, he decided that charcoal made from poplar wood was the best. He found that the charcoal of some other woods caused a disagreeable taste in his mouth—even painful excoriations of the mucous membrane —thirst, and a pinching sensation at the pit of the stomach. He was in the habit of prescribing from two to six teaspoonfuls, but says he has himself taken as much as 500 grammes—more than fifteen ounces in a day. The Académie Nationale de Médecine reported favourably on a memoir which Dr. Belloc published on the use of charcoal, and in France it soon became a favourite remedy. Its reputation spread to this country, and at this day charcoal lozenges, and even charcoal biscuits, are sold as dyspeptic remedies.* Belloc's charcoal is in the form of a moist powder, and he advised that it should be taken stirred up in water In this country charcoal is occasionally prescribed in mixtures. The biscuits and lozenges must of course

* Its qualities are lauded in an essay by Mr. Bell, "On Vegetable Charcoal: its Medicinal and Economic Properties." Second Edition. Churchill, 1857.

be thoroughly impregnated with saliva to enable them to be swallowed. Now, charcoal taken in any of the above modes always seemed to me of little efficacy. My device was to give the ordinary wood charcoal freshly prepared and hermetically sealed in gelatine capsules. Nothing could have been happier than their effect in the case already referred to. Three or four capsules taken at a time were sufficient to give complete relief. Nor is it often that the objective evidence of beneficial action is so plain. When the sound on percussion over the greater end of the stomach was quite tympanitic, this would change into the ordinary clear tone of the part after the capsules had been swallowed a few minutes.

Encouraged by this case, the capsules were given in many other instances with excellent results. A series of experiments were now commenced, with a view to determine what kind of charcoal was best for the purpose, and whether the matter admitted of further improvement.

The power of absorbing effluviæ possessed by charcoal had been known for ages, but its action upon different gases was first tested towards the close of the last century by M. Lowitz. The subject was pursued by Count Morozzo, and afterwards

more fully by M. Saussure. He used boxwood charcoal exclusively in his experiments, and found that a single volume of it absorbed the gases which possess a present interest in the following proportions :—

Sulphuretted hydrogen	55
Carbonic acid	35
Oxygen	9·2
Nitrogen	7·5
Carburetted hydrogen...	5
Hydrogen	1·7

The able researches of Dr. Stenhouse, published in 1855, greatly increased the interest in the subject. His experiments were mainly directed to the deodorizing qualities of charcoal, and he proved beyond question that its properties of destroying the smell of putrid animal or vegetable bodies depended, not, as had been previously supposed, on its antiseptic power, but on the very opposite quality of absorbing and oxidising effluviæ. Several others have since that time investigated this absorbent action, and Mr. Hunter has recently published an account of his experiments, showing the relative amount of various gases taken up by different kinds of charcoal.*

* *Philosophical Magazine*, February, 1865.

He found that charcoal made from cocoa-nut shells possessed most power, and deduced a general rule that charcoal made from the harder woods was much superior to that from the softer. It may be added here, that animal charcoal, so useful as a decolorising agent, is very inferior as an absorbent.

In my own experiments, the gases were collected by displacement in the usual way. By a simple arrangement, the amount of absorption was determined by the quantity of mercury which flowed into, and was retained in the vessel containing the gas, into which the charcoal had been introduced. As the experiments have had a practical aim, they differ in some respects from those conducted by the purely scientific chemists. The gases were not dried, since, in the moist state, they more closely resembled those of the alimentary cavities, and combinations of other substances with charcoal were tried, in the hope of discovering a still more effective absorbent than simple charcoal. The experiments have been very numerous, but it has not been thought desirable to encumber the table with more of the results than are necessary to elucidate particular points; and, as the relative absorption of carbonic acid by different kinds of charcoal possesses most interest, a statement with regard to this gas alone

has been given. The absorbent action was instantaneous, and about seven-eighths of the whole was completed within two minutes. The time allowed for each experiment was an hour; but absorption continues at a slow rate for many hours. To obtain good results, the charcoal must be exposed to a high heat in the crucible, until gas no longer escapes; and it would seem that charcoal newly made is superior to that which has been re-ignited.

Table showing the Absorption of Carbonic Acid by Twenty Grains of Different Kinds of Vegetable Charcoal.

	Experiment.	Mean.
Vegetable ivory nut in small fragments, freshly ignited...	2·26 2·26 2·20	2·24
Vegetable ivory, finely powdered, and freshly ignited	2·20 2·20 2·12	2·17
Vegetable ivory, freshly ignited, and ammoniated	2· 1·92 1·94	1·95
Vegetable ivory, platanized (2 per cent.) ...	1·74	1·74
Vegetable ivory, freshly ignited, soaked in water	1·36 1·32 1·24	1·30
Vegetable ivory, freshly ignited, covered with a layer of water	0·0	0·0
Coquilla nut, freshly ignited	2·0 1·94 2·4	1·99
Cocoa-nut shell, freshly ignited	2·0 1·98 1·92	1·97
Acacia wood, freshly ignited	1·80 1·88 1·94	1·87
Peat, freshly ignited	1·80 1·66 1·82	1·76
Belloc's charcoal, freshly ignited	1·82 1·80 1·70	1·77
Belloc's charcoal as sold, without ignition ...	·68 ·66 ·66	·67

From this table the following deductions may be made:—Charcoal made from the most solid vegetable substances is greatly superior as a gas absorbent to that made from the lighter kinds, like Belloc's preparation; and that made from vegetable ivory is the best.

The absorbent power of charcoal is slightly weakened by pulverization, is much impaired by exposure to the atmosphere and damp, or by saturation with water, and is altogether prevented by sufficient water to cover it.

Charcoal, to be effective against gastric flatulence, must be introduced amongst the gases of the stomach in the same state as when fresh from the crucible The means for effecting this, enclosing it in gelatine capsules, so that it may be set free in the stomach by solution of the gelatine, has been already described.

It may also be inferred that, as the absorbent action is protracted, and although much impaired is not destroyed by being wetted, charcoal may still prove beneficial when it is passed into the intestines.

Charcoal, by virtue of its porous nature, takes up gases mechanically as a sponge takes up water. Its capacity, in this respect, is in proportion to the number and fineness of its pores. Charcoal made

from vegetable ivory or cocoa-nut shell is a compact, heavy substance, having a metallic lustre and ring, the pores being quite invisible.

This kind of charcoal, then, is best adapted to the present purpose. It should, in the first instance, be carefully prepared, by sufficient ignition, and when about to be filled into the capsules should be powdered and re-ignited in a crucible. Charcoal impregnated with chloride of platina has been recommended as an absorbent by Dr. Stenhouse, but it did not answer my expectations.

An experiment conducted for me by Mr. Robbins, to whom I am indebted for much valuable aid, shows how necessary it is that good unsaturated charcoal should be used.

An iron bottle, to which a long tube of the same material was adapted, was filled with twelve ounces of ordinary medicinal charcoal and placed on a strong fire. A glass tube, tapered at the free end to a very small size, was adapted by means of india-rubber tubing to the free end of the iron tube. As soon as the charcoal ignited, gas began to issue from the glass tube, and continued to do so for about two hours. It could be lighted, showing the presence of carburetted hydrogen and other inflammable gases, which had been taken from the

atmosphere by the charcoal. It is possible that the gases present were partly due to the charcoal not having been well made; but, in any case, the experiment shows that charcoal ordinarily used in medicine is badly adapted for absorbing gases.

Charcoal always contains oxygen, because, when taken from the crucible, it immediately obtains it from the atmosphere, and its affinity for nitrogen is much less. This easy separation of its component parts goes to prove the soundness of the opinion that the combination of oxygen and hydrogen in common air is purely mechanical.

Charcoal has a different point of saturation for every gas; but when filled with one or more, it is still capable of absorbing other gases. Thus, coarse-grained charcoal, saturated with ammonia, takes up more carbonic acid than charcoal without ammonia; and the same charcoal, when saturated with both, takes up a larger quantity of sulphuretted hydrogen than of either. This is a valuable property where, as in the case of the intestinal cavity, the gases are various. Much is still to be learned about it; but the reason why charcoal, saturated by ammonia, takes up carbonic acid so freely, is plainly due to the formation of carbonate of ammonia. The impregnation of charcoal with

oxygen has important therapeutic actions. It is this which renders it so valuable an agent in destroying the fetor of foul sores, and, when taken internally, of correcting putrefactive tendencies in the food; and it is also by virtue of this that sulphuretted hydrogen is not only absorbed, but immediately decomposed by charcoal.

The gelatine capsules employed are of two kinds —those ordinarily used for taking liquid medicines, and those made in separate portions which fit into each other; and in either case care is taken that they be hermetically sealed with gum or liquid gelatine as soon as filled. The limit of size for the capsules must, of course, be determined by the individual capability of swallowing them. The largest contained only five grains of the light charcoal at first used, and found so efficacious in the case mentioned, but the same sized capsule will contain more than ten grains of the heavy kind; thus a relative as well as an absolute advantage is gained, for the heavy charcoal possesses much higher absorbent powers.

Charcoal taken in large doses presents one great disadvantage: intestinal obstruction, as sometimes caused by magnesia, has been the consequence. Now, the table proves that vegetable ivory char-

coal freshly ignited is three times more effective than Belloc's damp charcoal; and this efficacy must be diminished by the necessity for mixing Belloc's charcoal with water preparatory to being swallowed. If it sink in the fluids of the stomach, which, should any be present, it inevitably will do in consequence of the saturation, its efficacy will be altogether destroyed. But granting that charcoal taken in the ordinary way has a certain absorbent power, a very large dose will be required to equal the activity of a single capsule of the heavy charcoal.

It may be objected that, although charcoal be swallowed in hermetically-sealed capsules, it must necessarily undergo liquid saturation as soon as set free in the stomach. But charcoal, not being easily wetted, will float on the surface of its contents; and to test its capability of absorption when in this position, I tried the following experiment:—

Into a receiver containing carbonic acid a little warm water was introduced; a capsule of heavy charcoal was then put into the receiver. The gelatine having been dissolved by the water, its contents were set free in about a minute, and the charcoal floated on the water. Absorption now proceeded actively.

The number of capsules to be taken must vary according to the degree of flatulence, but three or four will generally be found sufficient. It is not advisable to drink while swallowing them, but the process may be aided by eating a small piece of dry bread.

Twenty grains, or two capsules, of the vegetable ivory charcoal absorb more than two cubic inches of carbonic acid gas. If a greater effect be desired, and the dose be increased to four capsules, nearly five cubic inches will be taken up. Now, admitting that these effects are not quite so active in the stomach as they are in the experiments, there must still be absorption enough to give relief to the patient. The effect may at any time be tested and the repetition of the dose guided by percussion over the greater end of the stomach. More charcoal should be taken so long as the percussion sound is tympanitic.

Vegetable ivory charcoal in capsules is now in extensive use both at home and abroad, and I have received many reports of the results. With few exceptions these are very favourable, and occasionally the charcoal seems even to remove the tendency to flatulence. The most marked cases of success will be found to be those in which distension is such as

to cause a temporary paralysis of the muscular fibres of the stomach. In these instances absorption of a portion of the gas is the cause of the expulsion of much more, as previously explained, and ordinary carminatives then give assistance. In some cases, however, carminatives alone are all that is requisite.

The beneficial action of charcoal need not be confined to the human subject. I have suggested its use in appropriately-sized capsules for flatulence in horses, and also as a remedy for that frequently fatal distension of the first stomach from carbonic acid which occurs in cows after certain food, such as clover and potatoes, and hope to hear of their successful application.

ERRATUM.

Footnote, page 24. For *Chapter X.* and *Appendix B.* read "Chapter XI. and Appendix B."

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